A

SYSTEM

OF

PRACTICAL MEDICINE

COMPRISED IN

A SERIES OF ORIGINAL DISSERTATIONS.

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DISEASES OF ARTERIES.

FUNCTIONAL DISEASES OF ARTERIES.

Functional disorder of the aorta and arteries arising from it.—Neuralgia.—Inordinate pulsation.—Treatment.

In treating of the disorders of the arterial system which fall more particularly under the care of the physician, we commence with those of a purely functional kind, passing afterwards to others of an inflammatory and of an organic nature.

1. *Neuralgia.* The most remarkable of the nervous and functional derangements of the arterial trunks, consist, first, in an intense neuralgic pain in their course, having its seat most probably in the minute ramifications of the ganglionic nerves which form a close network around them and penetrate into the substance of their walls; and, secondly, in such inordinate pulsation as is independent of any appreciable inflammatory action or organic change in their coats. Both of these affections may exist simultaneously; but the latter, or increased force of pulsation, occurs much more frequently alone, and the affected artery generally presents during its continuance the additional phenomenon of bellows murmur, which is occasionally audible at the same time in other portions, also of the arterial system. This sound is ascribed by Bouillaud, Williams, Piorry, and most others who have alluded to it, as we have already seen, to constriction of the tube in which it originates; whilst Dr. Corrigan, on the contrary, recognises its immediate physical causes in the laxity of the coats of the vessel below such obstruction facilitating their vibrations, and in the current-like flow of the blood which plays against them and throws them into tremulous motion (p. 263.). The occasional existence of a variable and intermitting bellows-murmur behind the upper part of the sternum, in the absence of all evidence of organic disease, shows that the thoracic portion of the aorta, or the great vessels arising from it, may sometimes be the seat of increased action of the kind here spoken of; but it is in the upper part of the abdomen, where the aorta and its branches fall more within the reach of the sense of touch, and where their vitality is most exalted, if we may judge by the innumerable nervous filaments by which they are embraced and penetrated, that this phenomenon is most frequent, and has particularly attracted attention under the title of

2. *Inordinate, abdominal, or epigastric pulsation.* The diastole of the abdominal aorta, which may often be distinctly felt, even in the natural state in thin individuals, on making firm pressure with the points of the fingers in the epigastrium, a little to the left of the median line and downwards, becomes in the morbid condition here spoken of much augmented in force, and disagreeably perceptible to the subject of it, who, in addition to the physical uneasiness caused by it, suffers still more from the alarming apprehensions he often entertains as to its nature and tendency. It was frequently, indeed, mistaken even by medical men in former days for evidence of the existence of aortic or cœliac aneurism, till in the progress of pathological investigations, and especially those made by Morgagni, and subsequently by the late Dr. Baillie, it became certain that it was altogether independent of organic disease in a very great proportion of the cases where it occurred.

But though epigastric pulsations have thus been deprived of much of their formidable character, it still remains in many instances dubious to what particular state they owe their origin, the cause by which they are induced, as well as the precise condition of the vessel in which they have their seat, being both often almost equally obscure. It is even sometimes very difficult to decide whether it is not in the cœliac axis or some of the subordinate branches of the aorta rather than in this vessel itself that they take place. Their variable and intermitting nature, the saddenness of their appearance and cessation, the

freedom from any severe fixed pain in the spot or in the surrounding viscera, as well as in the corresponding portion of the spine, such as might indicate internal pressure, together with the absence of all evidence of mechanical obstruction to the circulation or permanent alteration in the caliber of the vessel, prove them to be altogether independent of organic narrowing of the artery on the one hand, as well as of its enlargement or aneurism on the other. The pulsation, occasionally accompanied by a feeble murmur, especially when in the horizontal posture, is confined to the natural line of the vessel, its extent in the lateral direction being much more limited than in the longitudinal, as becomes manifest on making firm pressure with the stethoscope successively over its course, and to each side of it: and though it may sometimes be accompanied by a degree of fulness in the epigastric region, yet this is commonly readily distinguishable from that caused by aneurismal tumour, by its being of less definite outline, as well as less permanent, depending as it often does on flatulence or fæcal accumulation in a portion of the colon or of the small intestines, which has the effect at once of irritating the vessel by compression, and of conveying towards the surface the bellows-murmur and impulse so produced. The short jerking impulse, moreover, is commonly very different from the gradual and expansive heaving of an aneurism. The attentive consideration of the accompanying symptoms will tend still further to elucidate the diagnosis.

Pulsation of the kind alluded to is peculiarly frequent in hypochondriacs, and in those whose digestive organs are deranged, or in whom an habitual effusion of blood from the hæmorrhoidal veins has suddenly ceased, as well as in individuals of an highly nervous temperament, in anæmia, and particularly in hysterical and chlorotic females, when labouring under deficiency or irregularity of the menstrual evacuations. Its connection with a disordered state of the abdominal nerves is recognised by Senac, Albers, Burns, Laennec, and Hope. M. Dance conceives it to originate more particularly in a morbid state of the functions of the solar plexus, its ganglia and ramifications, an opinion which has likewise been advocated by Dr. Law and many others, and very recently sustained with much zeal by Mr. Faussett, who however at the same time deprecates the idea of its being a merely nervous affection in the common sense of the term, as he believes that there exists in every instance more or less congestion of the ganglionic centres, as well as of the viscera which they supply, these probably re-acting mutually on each other, and as well as on the walls of the aorta through the medium of the nervous filaments distributed to them. That such a local plethora exists, or even in some instances a state of subacute inflammatory action, he is led to believe by the frequent presence of tumefaction in the epigastric region, accompanied by tenderness on pressure, and a sense of anxiety or sinking at the pit of the stomach, or just over the suspected ganglia; as well as from the efficacy of active depletory measures in the reduction of the morbid pulsation and attending symptoms. It is indeed now generally admitted that abdominal plethora is concerned in the production of the pulsation in question in a great many instances, but the peculiar temperament and the state of the heart's action in particular are also very important elements in perhaps a still greater number. Some writers, amongst whom Dr. Johnson is to be classed, seem disposed to confine its occurrence to those cases in which there is either an excited state of the arterial circulation generally (so often observed in connection with gastric irritation and its sympathetic influence on the heart), or else a local obstruction in the capillaries of some of the abdominal viscera, as in congestion and inflammation of the liver, fæcal accumulation, &c. acting as it were like a ligature, and rendering the pulsation of the arteries leading to them more obvious.

Two remarkable cases have been recorded by Albers, in which this morbid symptom ceased immediately on the passage of abundant dark evacuations from the intestines, proving its occasional dependence on deranged secretion of the liver and mucous membrane; and a still more striking example is mentioned by De Haen, where it existed in a most violent degree along with

many of the worst symptoms of aggravated organic disease of the heart, all of which vanished at once on the occurrence of a spontaneous purging of greenish fetid matter. Cases of such happy termination must not, however, make us forgetful of the fact of the frequent connection of aortic pulsation with real structural disease of the heart, and more especially with hypertrophy.

The co-existence of tenderness in the spine, in some cases of abnormal pulsation, has been particularly insisted on by Mr. Teale. Dr. Baillie speaks of an instance of its sudden cessation on the supervention of gout in the extremities. Hæmorrhage from the gastro-intestinal mucous membrane has been occasionally preceded or accompanied by this phenomenon, and a case of the kind, which, from the supervention of hæmatemesis on violent action in the aorta, had been mistaken for rupture of an abdominal aneurism, is alluded to by Dr. Law. Increased abdominal pulsation, if attended with fever and unaccompanied by a proportional increase of strength of the pulse of the wrist, has been pointed out by Dr. Stokes as one of the symptoms of intestinal inflammation.

Where epigastric pulsation occurs in hypochondriacal and nervous subjects it is very commonly attended by a sense of fullness and throbbing in the head, with coldness of the feet, and most frequently makes its appearance in the sedentary, and those about the middle period of life. When but of momentary duration it very often depends,—according to the remark of Laennec, the correctness of which we have had frequently occasion to verify,—on imprisoned flatulence in the superincumbent intestine, concurring occasionally with a state of nervous excitement of the heart's action. When of a more permanent character it has been known to originate in the pressure of enlarged viscera and other abdominal tumours, which at once narrow the caliber of the artery and transmit its augmented impulse to the surface of the abdomen.*

Treatment. As to neuralgia affecting the arteries, it is to be combated on the same principles as when it occurs in other parts. (See NEURALGIA OF THE HEART, &c.)

On the treatment of abdominal pulsation it is likewise unnecessary to enter at length, seeing, from all that has been said above, that it is obviously nothing but a *symptom*. The morbid conditions from which it springs are, as we have just shown, various, and consequently the remedial measures appropriate in different cases must be no less dissimilar. It may, however, here be said generally, that the first object to be aimed at in almost every case is to get the secretions into a healthy state, especially those of the chylopoietic viscera, seeing that dyspepsia and derangement of the alvine evacuations are so often present. In females, moreover, the regulation of the uterine functions is never to be overlooked.

Where there is evidence of a plethoric condition of the organs within the abdomen, in addition to the steady use of mild aperients, especially of the saline class, together with the occasional exhibition of a mercurial purge, restriction to a vegetable or farinaceous diet, and the renunciation of wine, coffee, and other stimulants is indicated; and in addition to these measures the local abstraction of blood, either from the epigastrium or hæmorrhoidal vessels, or in some instances even general bloodletting, may be proper, along with counter-irritation, either over the seat of the abdominal pulsation, or in the portion of the spine just opposite to it, which latter situation should of course have the preference in those cases where spinal irritation co-exists. In particularly obstinate cases, where the pulsation and visceral congestion with which it is associated are the

* A distinct "encephalic bellows-murmur" has been noticed by Dr. Fischer, an American physician, on the application of the stethoscope to the upper part of the head in cases of meningeal inflammation, and is supposed by him to be connected with compression of the numerous arteries at the base of the brain. Dr. Forbes, to whose early and able advocacy the cause of auscultation has been so much indebted in this country, pointed out, many years ago, the occurrence of a similar phenomenon in the mass of the thyroid gland, when enlarged, as in cases of bronchocele,—the sound originating probably in compression of the carotids, or their branches.

source of very serious and prolonged annoyance to the patient, it may be justifiable to follow the example of Mr. Faussett, and employ, in addition to the antiphlogistic remedies already detailed, mercury in combination with antimony and sedatives in such a manner as slightly to affect the mouth, and subdue any existing local determination.

Hohnbaum, a recent German writer on the subject of epigastric pulsation, having himself suffered for years from it in connection with various dyspeptic symptoms, venous plethora of the abdomen, debility of body, and despondency of mind, found more relief from the use of the aperient waters of Carlsbad, along with the accompanying change of air and scene, and relaxation from the fatigues of his profession, than from all the very numerous and diversified methods of treatment he had previously essayed.

Where a chlorotic or anæmic, a nervous or irritable state of the system constitutes the predominant feature of the case, all weakening losses of blood and excessive evacuations should be controlled; and the employment of tonics, and more especially iron or bark, the tepid or cold shower bath, are called for, along with a liberal supply of light nutritious food, the enjoyment of a dry bracing atmosphere, and daily exercise in the open air. These, together with early hours, cheerful society, and freedom from anxiety of every kind, are the means which give the patient the best chance of at once getting rid of the annoying symptom we have been considering, as well as of the numerous associated derangements in other parts.

ARTERITIS, OR INFLAMMATION OF ARTERIES.

Anatomical characters and effects of arteritis. — Predisposing causes. — Exciting causes. — Symptoms. — Treatment of arteritis and its consequences.

There has been much difference of opinion amongst pathologists as to what constitutes adequate anatomical evidence of the existence of arteritis: redness alone certainly does not, as staining of the inner membrane, and even of the cellular tissue on its adherent surface, is often a mere cadaveric phenomenon, the joint result of softening of the tissue from incipient putrefaction, and of the contact of the contained blood, which, especially when in a fluid or imperfectly coagulated condition, as for example in typhoid diseases, or after a long final agony in various chronic disorders, readily affects, by imbibition, the interior portion of the arterial tubes. Redness from this source is most apt to be met with when the temperature is elevated, and the examination of the body has not been made till several hours after death.

In the investigation of this subject, a vast number of horses were opened by MM. Rigot and Trousseau at various intervals after they had been slaughtered, and they assert that in no instance did the appearance in question present itself to their notice when sought for immediately after the creature had fallen, though it was common enough after the lapse of some hours; a fact which proves that redness of the arteries proceeding from a morbid or vital action, must be, at least in these animals, of very rare occurrence. But we must here beware of generalising too hastily and exclusively. In particular epidemics amongst horses, such as that which existed at Paris in 1825, and which was characterised by gastro-enteritic symptoms, and a difficulty of breathing independent altogether of pulmonary inflammation, redness of the interior of the arteries as well as of the heart, apparently of an inflammatory nature, was occasionally detected by Dupuy, Bouley, and Andral, even immediately after the diseased animal had ceased to breathe. All analogy, indeed, would prepare us to expect that inflammation should sometimes originate spontaneously, or at least independently of all direct external injury, in the membrane in question. In the human subject, where we find a diffused redness of the internal tunic,

delicately shaded off on its edges, accompanied by softening, pulpy thickening, and infiltration of this and of the middle coat and their connecting cellular membrane, along with unusual facility of their separation, and distinct increase of vascularity in the same situations, the probability of these changes depending on inflammatory action is very strong; and where coagulable lymph or pus has been effused on either the free or the attached surface of the lining membrane, or ulceration taken place, the evidence of the existence of this morbid process becomes complete. Now all these appearances have occasionally, though rarely, been met with independent of all external violence done to the vessel, proving sufficiently that the arterial tissue enjoys no absolute exemption from spontaneous inflammatory action. The middle or fibrous coat in these cases loses much of its natural elasticity, and becomes remarkably fragile, and even the external or cellular one, though much less prone to disease, is somewhat softened and less capable of suffering distension with impunity.

It is obvious that from the facility with which morbid effusions are washed away by the passing blood, there may be many incipient cases of real inflammation in the interior of the vessels, as to the true nature of which, as judged of by the appearances on dissection alone, we shall yet remain in doubt, in consequence of the absence of the most characteristic and indisputable of the evidences mentioned above.

It has been satisfactorily proved by M. Bizot, by tracing the transformation step by step, that the white cartilaginous patches so often observed in the interior of the arteries originate in the albuminous exudations of acute arteritis, which, at first of a viscid gelatinous consistence, and of a pale or rosy hue, become gradually whiter and firmer, and eventually supplant the lining membrane, on the inner or free surface of which they were originally poured out. The result of his researches does not, however, countenance the common opinion of these patches being a preparatory state to ossification; for he has never succeeded in detecting them in the state of transition. (*Brit. and For. Med. Rev.*, No xi.)

The ulcerations occasionally observed in the lining membrane are very commonly connected with atheromatous or osseous depositions in the fine connecting cellular membrane between it and the middle coat, which by the pressure and irritation to which they give rise eventually make their way through the delicate inner tunic, so as to come into actual contact with the blood.

Whether these deposits ordinarily originate in a local inflammatory process of a subacute or chronic character, is still a litigated point; but as to their influence in destroying the elasticity and producing ulceration and perforation of the coats, gradual aneurismal tumours, or sudden and fatal rupture of the vessels, there can be no question.

Sometimes all the layers of an artery are found of an unnaturally white colour, and more opaque and less elastic than usual; a condition in which, obviously, they can no longer respond to the heart's impulse with the same safety to their own tissue.

The atheromatous patches so often observed in the aorta and larger arteries, consisting of matter of a cheesey friable consistence and yellowish hue, commence, according to Bizot, who has very minutely investigated this point of morbid anatomy, by innumerable minute granules of a pale yellowish colour, situated between the middle and inner coats, adherent to both, and unattended by any redness or trace of inflammatory action in the surrounding tissues. These granules, as they accumulate, coalesce into groups or masses, which subsequently may become the seat either of a process of ulcerative softening, or else of ossification. When the former of these two changes occurs, the softened matter in some degree resembles pus, and the appearance so produced has by some observers been described, but erroneously, as an abscess or a pustule in the interior of the wall of the vessel, whereas it approximates in reality much more nearly to the process by which tubercles become softened. The calcareous deposit commences by minute, hard, semitransparent specks in the

substance of the atheromatous patches, especially where in contact with the middle coat, which becomes wasted beneath their influence, as does likewise the inner membrane even to its total destruction. As the atheromatous matter frequently lines the back of the whitish or cartilaginous patches mentioned above, and may equally here become the seat of bony deposition, the common error of ascribing the osseous scales, in general, to the transformation of previously existing cartilage is, in some degree, accounted for. The smaller arteries may be entirely obstructed by these morbid deposits, and the elasticity of the larger being greatly impaired, they readily become the subjects of gradual dilatation. These perversions of nutrition take place at a much earlier period of life in the lower extremities than in the upper, and generally in symmetrical order; that is, the same arteries and corresponding portions of them become, for the most part, almost simultaneously affected on the two sides of the body. The yellow spots make their appearance first in the arteries nearest the aorta; the ossific deposits, on the contrary, earliest in those most remote. Arterial lesions are most frequent in the proximity of the branchings of the vessels.

The extent to which calcareous degeneration may take place is very considerable, as it manifests itself sometimes not only in the aorta and its primary branches, but also in the arteries of the heart, brain, and extremities, which may thus be converted into rigid tubes, or have their interior irregularly lined with a scaly deposit like loosely adherent fragments of egg-shell, a condition which interferes much with the natural functions of these vessels, and lays the foundation for apoplexy, aneurism, gangrene, and other formidable species of disease. It adds much, likewise, to the uncertainty of the result of all surgical operations in which vessels have to be tied, both on account of the risk of secondary hæmorrhage, and also, in some cases, from the difficulty of the establishment of the supplementary or collateral circulation. According to Morgagni, sudden death is not unusual in individuals in whom no other morbid appearance is detected besides numerous ossific scales, or ulcerative depressions in the spots where these scales have become detached. A very singular case has been recorded by Dr. Abercrombie of the total cessation of pulse in every artery in the body except the carotids, in consequence of ossification of their coats; and a still more remarkable one is detailed by Mr. Adams, in the *Dublin Hospital Reports*, where there was no pulse at all in any part, and even at the heart no indication of motion beyond a very feeble undulating sound. On dissection the aortic valves were found ossified, and the coronary arteries of the heart obliterated for near an inch at their origin,—a state of things which accounted at once for the diminished action of the heart and impeded flow of the blood. The principal remaining symptoms were dyspnœa and sleeplessness of many weeks' duration, terminating in stupor and death. In a case spoken of by Andral, in which the pulse in the left wrist was peculiarly feeble, a round cretaceous tumour was discovered on dissection within the brachial artery, nearly filling its caliber. Such loose concretions originate probably, for the most part, in the walls of the vessel from which, in process of time, they become detached, and may be the source of complete obstruction in the smaller branches.

All the morbid deposits above spoken of are of peculiarly frequent occurrence in the aorta, especially about its commencement and arch, and account, in part, for the very great frequency of dilatation in this portion of the vessel. Ossifications are of so common occurrence in advanced life, that their absence now excites more surprise than their presence. That they should be so much more frequently met with in the aged than in the young shows that, even if their origin be sometimes determined by chronic inflammation of the coats of the vessel, still a certain predisposing condition of the system is, at least, equally concerned. The arteries of the young are not, however, altogether exempt from this change, and examples of it have been discovered even in the bodies of infants. Its extensive existence, at a later period of life, serves to account for some anomalies in the pulse of old people, its hardness and occasional difference at the two wrists, and the slight degree in which it is affected

by venesection, as well as for the difficulty with which the circulatory system, in many instances, accommodates itself to this evacuation.

Ossification of the vessels is almost confined to those which carry red blood: it has, however, in some very rare instances, been noticed in the pulmonary artery. The cartilaginous change is less infrequent.

The inner membrane of arteries is sometimes found in a state of chronic softening; and, when in such a condition, its laceration may be determined by very slight causes, such as would have no influence on it in a state of health. In some very interesting cases of this kind, which have been published by Mr. Turner, portions of the interior lining were found retracted and rolled up within the canal of the vessel. In this manner, and by the accompanying effusion of plastic lymph and the formation of a coagulum of blood, the artery may become completely obstructed and obliterated in a portion of its course; all pulse below the spot ceasing immediately on the occurrence of the accident. The seat of the local lesion is commonly indicated by the sudden supervention of pain and swelling. Occasionally the arteries of the upper and of the lower extremities become thus affected in succession on the employment of the slightest exertions, indicating a very extensive affection of the arterial system. In most of the cases recorded there had been previous febrile symptoms of some continuance and originating commonly in cold. Paralysis and gangrene of the limb, and death, were occasional consequences of the impervious state of the artery. The cold dead state of the part was, in some instances, supplanted by obvious inflammatory re-action on the re-establishment of the collateral circulation. In a case which occurred to Dr. Abercrombie ulcerations were found to co-exist within the aorta; and this, as well as the cause and symptoms of the disease, all seem to point to an original inflammatory action as the source of the softening of the vessel. Some interesting cases bearing on this connection of gangrene with arteritis have also been published by Dr. J. Graves and Dr. Stokes in the 5th vol. of the *Dublin Hospital Reports.*

The obliteration of arteries may also take place from the mere inflammatory thickening of their coats, or the effusion of lymph into the cellular membrane connecting them, or into the interior of their canal without any previous rupture of the inner coat. Even the innominata has been found almost filled by an unnatural growth from, or hypertrophy of its lining membrane, and the aorta itself, quite independent of congenital narrowing, has thus, in more instances than one, been detected in a state of perfect obliteration, whilst the arteries which arose above the obstructed point, being much dilated, in a great degree supplied its place.

The thoracic aorta has, in several instances, exhibited an *abrupt constriction,* especially at that point where the ductus arteriosus penetrates its coats; a condition attributed, with much probability, to the communication of the contractile action naturally taking place in this passage at the period of birth to the adjacent fibres of the arch.

Amongst the *predisposing causes* of arteritis have been enumerated a plethoric and irritable state of the body, habitual over-distension of the vessels by frequent violent exertions, the excessive use of spirituous liquors, and hypertrophy of the heart, as likewise a gouty or rheumatic habit, to which Scarpa, Hodgson, and some others have added, on more dubious evidence, the morbid conditions of the constitution induced by the poison of siphilis, or the long-continued use of mercury.

The *exciting causes* of inflammation of arteries, independent of wounds, pressure or ligature, sudden and violent elongation of the vessel, and other external injuries by which the inner coat is so often lacerated, may be referred generally either to exposure to cold, violent mental emotions, excessive bodily fatigue, or else to the spread of inflammation from the cyst of an abscess or ill-conditioned or gangrenous ulcer; to unhealthy pus and various morbid poisons, such as that generated in puerperal and other malignant fevers, glanders, &c. introduced into the torrent of the circulation; and, finally, to the repulsion

of measles or small-pox, scarlatina, or erysipelas, 'or other acute cutaneous inflammations. In several of these latter cases the inflammation of the lining of the vessel has presented somewhat of an erysipelatous character, spreading rapidly towards the heart from being unattended by any effusion of coagulable lymph by which its progress might be limited; whilst the accompanying fever is commonly of a low or malignant kind.

The *symptoms* of arteritis even in its acute form are very obscure. Those usually ascribed to it are, increased energy of pulsation in the inflamed vessel, a sense of heat and pain along its course, together with restlessness, extreme anxiety, and a frequent feeling of sickness or faintness, and all the other common sympathetic effects which the inflammation of any important part of the body exerts on the heart, brain, skin, digestive organs, &c.

The opinion of Frank, that arteritis gives rise to a peculiar fever of great intensity, has not, however, been confirmed by subsequent observers. In the carefully noted cases of Mr. Turner, already alluded to, the fever did not usually run very high: nor indeed is there any one of the symptoms enumerated above, which can be considered as truly characteristic. We are not as yet, it must be confessed, in possession of any unequivocal diagnostic mark of the inflammation spoken of: and it is for the most part only by negative signs that we can attain even to a probable suspicion of its existence when it occupies the interior of the body—namely, by the absence of all evidence of any other thoracic or abdominal inflammation, aneurism, or other tumour pressing on the vessel in its course, as well as by the absence of re-action from the loss of large quantities of blood, or of the nervous pulsations already described, and in short of every other cause by which either the energy of the action of the suspected artery might be augmented in the first instance, or its channel subsequently obstructed.

As the disease proceeds, if a large extent of the arterial lining becomes implicated, or effusions of a purulent or sanious character take place into the canal of the vessel, the accompanying fever changes from the inflammatory to a low typhoid type, the pulse becoming very quick, feeble, and unequal, the respiration hurried, the capillary circulation embarrassed, and at length muttering delirium and spasmodic twitching of the limbs supervening, the scene soon closes, and on dissection effusions are often found to have taken place into the several serous cavities. Where, however, healthy coagulable lymph has been effused, and the inflammation thus limited to a single artery, the caliber of which becomes obstructed, and the communication with the rest of the system impeded, the effects of the morbid process are of a less rapid and certainly fatal character. If it be confined to the artery of a limb the part becomes pulseless, incapable of motion, cold, swollen, and purplish; large vesications making their appearance, and fully formed gangrene eventually ensuing, whilst the ultimate result depends mainly on the patient's constitution and remaining strength.

Treatment of arteritis and its consequences. Where after a scrupulous examination of the symptoms, both negative and positive, there appears a very strong presumption for the existence of inflammation of the aorta or other large internal artery, either alone or, as pathological researches show to be so commonly the case, in combination with serious disease of a similar nature in some of the viscera to which their branches are distributed, active antiphlogistic measures are immediately to be resorted to, general and local bleeding, aperients, antimonials, and diluents, together with strict confinement to the horizontal posture and perfect quietude. If the inordinate pulsation, the fever and other distressing symptoms, be not then very speedily reduced, the exhibition of mercury so as to affect the constitution, provided there be not a decided contra-indication to its employment in the state of the patient's strength or general habit of body, together with digitalis or colchicum to keep down the heart's action, and narcotics to assuage pain, form our chief remaining resources. At a somewhat

later period, or in a more chronic form of the affection, active counter-irritation by blisters, tartar-emetic ointment or croton oil should also be practised.

With a view to controlling the occasional chronic consequences of arteritis, and limiting more especially the progress of osseous deposition (which whether or no it be ever in its essence an inflammatory process, seems at least most prone to take place in parts which have been once the seat of inflammation), as well as to retard the secondary affections dependent thereon, as aneurism, apoplexy, &c. the most rational plan of practice appears to consist in such a regulation of the diet, secretions, and excretions, as may at once keep the action of the heart moderate, obviate plethora, and subdue any tendency to sub-inflammatory action which may exist, without at the same time too much enfeebling the system. The greatest moderation in respect to fermented liquors and animal food should be enjoined, as the free indulgence in their use is well known to produce the very states which it ought to be our chief aim to avoid, and in a particular manner to augment the tendency to arthritic or calcareous deposits throughout the body. Depletory measures carried to a moderate extent should be very early had recourse to on the occurrence of inflammatory action in any part of the system, or where there is evidence of any unusual degree of vascular repletion, lest the weakened vessels should give way under the temporarily augmented action of the heart: and in general even when the patient is in his average state of health, the action of the liver and bowels as well as of the kidneys and cutaneous surface should be promoted, and the functions of the stomach which are so often, especially in gouty subjects, inadequately performed, should be corrected and strengthened. Regular but very moderate exercise in the open air is to be enjoined, together with the scrupulous avoidance of all those agencies, physical or moral, by which the circulation might be deranged or unduly accelerated.

ANEURISM OF THE AORTA.

Varieties — true — false — mixed—hernial.—Comparative frequency in the sexes. — Predisposing causes. — Symptoms of aneurism of the aorta and effects on contiguous structures. — Spontaneous cure.— Aneurism of the thoracic aorta. — Aneurism of the pulmonary artery. — Aneurism of the abdominal aorta. — Treatment of aortic aneurism.

An artery may become abruptly enlarged in some parts of its course either by means of the simultaneous dilatation of all its coats from their being peculiarly weak and deficient in elasticity at the affected point, or else by the rupture of the inner and middle coats and the subsequent gradual distension of the outer or cellular one. In both these forms of aneurism the surrounding portions of the artery almost invariably present obvious marks of alteration both in colour and texture, the strength and elasticity of the vessel being very commonly remarkably impaired either by atheromatous or osseous depositions or both, and where the lesion is of recent origin, the inner membrane being sometimes of a bright reddish hue mottled with white spots.

The first of the two varieties of aneurism just mentioned constitutes the *true aneurism* of systematic writers, and may either implicate the entire circumference of the vessel in one or more points in its course, giving to it for the most part an ovoid or fusiform outline at these portions, or else, as has been observed in some very rare instances, it may be confined to one side of it and so form a hollow lateral protuberance or pouch communicating freely with the arterial tube. The reality of this latter form of true aneurism, though doubted by Scarpa and some other distinguished pathologists, has yet in a few cases been fully ascertained by subsequent investigators, by carefully tracing all the

membranes of the vessel in unbroken continuity in the parietes of the appended tumour. The tunics thus dilated have in some instances appeared of their natural thickness; but more commonly they are thickened decidedly in some spots, and attenuated in others, as becomes obvious from their unequal transparency on viewing them against the light. True aneurisms have been divided by Breschet into the sacculated, the fusiform, the cylindroid, and the varicose. The second is the most ordinary form: in the cylindroid a large extent of the artery longitudinally is implicated, as likewise in the varicose in which it becomes tortuous and knotty from the irregular dilatation of the walls of the vessels which are here peculiarly thin and flaccid.

The term *false aneurism* is applied to those more common cases alluded to above, where the inner and middle coats being either ruptured by violence, perforated by ulceration, or lacerated by the detachment of a scale of osseous matter, the outer or cellular coat becomes exposed to the distending impulse of the circulating blood, by which, as well as by the pressure of the accumulating coagulum which soon forms in the depressed surface, it is gradually dilated into a pouch which communicates by an aperture of greater or less size with the canal of the artery.

Sometimes again this laceration of the coats is consecutive, supervening upon their inordinate distension in cases of true aneurism; and here the false aneurism surmounts the tumour previously formed by the true, and to this compound lesion the name of *mixed* or consecutive false aneurism is commonly given.

The outer coat of the artery growing gradually thicker, and being for the most part still further strengthened and supported by the cellular membrane exterior to it becoming condensed and closely adherent to its outer surface, is frequently capable of resisting for a great length of time the internal distending force. The contained blood moreover coagulates within the sac in concentric layers, which increasing in density as they are older and more external, and becoming occasionally consolidated with the walls of the aneurism, add in a remarkable degree to its power of resistance. In true aneurism, especially when occupying the whole contour of the vessel, the formation of laminated coagula is much more rarely observed than in the false species, in consequence of the freer circulation of the blood through the cavity in the former; and in the few instances where it has been met with here, the inner membrane was usually found to have been considerably roughened either by ossific deposit or else by effused lymph, a condition peculiarly favourable to the retardation of the blood and its coagulation.

In addition to the forms of aneurism already mentioned, there is yet a rarer species which has been met with by Dupuytren and others, where the outer and middle coats being alone perforated, the inner one protrudes through them, thus forming what has been called a *hernial aneurism.*

Where an aneurism commences by the rupture of some of the coats of an artery in consequence of violent muscular exertion, there is reason to believe that the vessel must have been previously in a morbid state, either from steatomatous, osseous, or other degeneration: for the partial laceration of a sound artery in place of leading to its dilatation would rather, as Dr. Jones's experiments evince, give rise to the effusion of coagulable lymph and the obliteration of its canal. For the determination of an aneurism, however, something more than the mere morbid state of the vessels above alluded to would seem to be indispensable, for whilst aneurism is peculiarly the disease of the prime of life, these other lesions predominate more remarkably in advanced age. And again, notwithstanding the great frequency of aneurism in men as compared with women, there is no equivalent disparity in regard to the occurrence of these other preliminary morbid alterations; and finally, whilst these latter, as we have seen, for the most part occur in a symmetrical manner, that is, attack corresponding arteries of the two sides of the body about the same period, no such law is observable in respect to aneurism.*

* Bizot, *loco citato*.

In regard to the influence of *sex*, it would appear from a large number of cases analysed by Mr. Hodgson, that aneurism, if all kinds be taken promiscuously, is more frequent in men than in women, in the proportion of eight to one. With regard to *internal* aneurism, however, their relative frequency in the male sex as compared with the females is by no means so disproportionate as this; probably from their origin here being commonly more independent of external injuries, violent efforts, &c.

Of the *predisposing causes*. One of the most influential, as has been remarked by Mr. Guthrie (and our own experience is quite in unison with the observation) is the inordinate use of spirituous liquors, by which apparently a sub-inflammatory condition of the coats of the vessel is induced, leading to their gradual softening and disorganisation, whilst at the same time the force of the heart's contractions is inordinately increased to such a degree that the weakened artery is no longer capable of sustaining them with impunity. Enlargement of the heart often arises *pari passu* with disease in the great vessels, and the disturbance in the circulatory system is thus raised to its highest pitch. Violent blows or falls, and sudden vehement muscular efforts, have appeared in some instances indubitably the determining cause even of internal aneurism.

Symptoms. When the aneurismal tumour is so situated as to be within reach of the touch, it is generally sufficiently characterised by its expansive pulsation; and even where it lies without the limits of immediate examination, it for the most part eventually gives rise, by its pressure on surrounding parts, to a variety of symptoms, from which its presence may often be at least very strongly suspected. Thus mechanically it may cause displacement and deranged action of various organs in its immediate neighbourhood, and at length absorption of their structure, as well as fatal hæmorrhages into their substance or cavities. When nerves are compressed by it, pains like those of neuralgia are the consequence; when it comes in contact with bone, even this dense texture yields to the wearing influence and is destroyed to a greater or less depth, a result often observed in cases of aneurism of the thoracic and abdominal aorta, in which the sternum, ribs, vertebræ, and even the shoulder-blade may be perforated by it. Cartilage, on the contrary, very often escapes, having a much greater power of resisting the influence of the constant pressure and pulsation than the harder osseous tissue, probably in consequence of the elasticity and lower degree of organisation of the former; and accordingly we often find even where the vertebræ have been extensively removed, the intervertebral cartilages still almost uninjured, though actually bathed in the fluid contents of the sac, the parietes of which are themselves so prone to be absorbed under the re-active pressure of contiguous organs. The compression of the spinal cord by an aneurismal tumour, as well as by the effusion of its contents into the vertebral canal, has been known to induce sudden paralysis. An aortic aneurism may further give rise, according to its situation, to compression or perforation of the pulmonary artery, or vena cava, or even of the cavities of the heart itself,* the thoracic duct, œsophagus, trachea, bronchi, lungs, stomach, intestines or bladder; or it may open immediately into the pleural or peritoneal sacs, or into the cellular membrane behind them. The contiguous vessels may be contracted or obliterated by the pressure, the nerves flattened, and the muscles wasted in a remarkable manner. The periosteum of the bones with which it comes in contact may be either thickened or absorbed, or even, as Andral has pointed out, become the seat of an abundant secretion of osseous matter, increasing the tumour, and restraining in a certain degree its further growth, and retarding its rupture. The sac itself generally becomes at length the seat of increased action, and its perforation is commonly the eventual result, which in its turn leads to a hæmorrhage, for the most part at once fatal; unless, as sometimes happens, the power of resistance in the

* In a remarkable case recorded by Beauchêne, the aneurism burst into one of the auricles.

surrounding cellular membrane, condensed by the previous pressure and matted together by effused lymph, is such as to enable it to limit, at least for a time, all further effusion of blood. In this latter case a new sac, as it were, is formed around the original one, and thus what is technically called a diffused false aneurism is formed. But diffused aneurism may also originate in a primary form, by the simultaneous rupture of all the coats of the vessel in the very first instance, without the formation of any sac, and the immediate pouring out of the blood into the lax and unaltered cellular membrane, or into one of the great serous cavities in its neighbourhood. Where the tumour bursts through the skin, or into a canal or cavity lined by a mucous membrane, these textures appear to be destroyed by a sloughing process; whereas in the case of serous membranes, the rent is effected by laceration from over-distension. The patient may, however, be cut off without the intervention of rupture or hæmorrhage, by the mere effect of the compression of the surrounding parts, the œsophagus, air passages and lungs, the nerves, thoracic duct, or large veins, giving rise to inanition, or asphyxia, exhausting pain, or cerebral compression. Congestion and inflammation of the mucous membrane and parenchyma of the lungs are very frequent results, especially when the disease is seated in the thorax.

But aneurism happily does not always terminate fatally, whether by rupture or any of the other modes just enumerated. On the contrary, in some few instances a spontaneous cure ensues, either by the gradual condensation of the coagula, and the contraction of the walls of the sac, or by the pressure of its exterior surface upon the portion of the artery above it, the consequent obliteration of the vessel, and cessation of the distending supply of blood to the tumour, or finally by inflammation in the parietes of the cavity, either commencing there, or communicated from an abscess formed around them, and terminating either in adhesive inflammation, or in gangrene, with the formation of coagulum within the artery, and its consequent obstruction.

Aneurisms within the thorax may have their seat, not only in the ascending aorta, its arch, or descending portion, but also in the innominata and origin of the great vessels proceeding to the head and arms: abdominal aneurism in like manner is by no means confined exclusively to the aorta, having been met with also in most of the larger branches arising directly or mediately from it, as the cœliac axis, hepatic, splenic, gastro-epiploic, coronary of the stomach, spermatic, iliac, &c. The abdominal arteries indeed, as pointed out by Professor Harrison, are peculiarly prone to the lesion in question, in consequence apparently of their great tortuosity, the weakness of their proper coats and the slightness of their cellular sheath in particular, as well as of the little support they receive from surrounding organs, and their rapidly varying degrees of distension, in connection with the intermitting nature of the functions of the organs they supply. In their incipient stage they are for the most part unattended by any symptom by which their presence can be even suspected, and it is only when their bulk and pulsations have become notably increased that attention is at length called towards them. Their effects will obviously vary much in relation to their situation, indeed more in respect to it than to their mere magnitude: thus, for example, in a remarkable case of aneurism of the hepatic artery, detailed by Dr. Stokes, jaundice, from the compression of the biliary ducts, was a leading symptom.

The coronary arteries of the heart have in some very rare instances been discovered in a state of aneurismal dilatation; and examples of the disease in its sacculated form have been met with even within the cranium, in the internal carotid, vertebral and basilary arteries. In these latter cases the symptoms have been very obscure, such as obstinate headaches, singing in the ear or deafness, with more or less derangement of the sensitive and intellectual faculties, and finally apoplectic attacks. It is probable however that the careful employment of the stethoscope would in some of these cases reveal the existence of a bellows-murmur and facilitate their diagnosis.

It is chiefly to aneurism of the aorta, as being of most frequent occurrence, and productive of very formidable and embarrassing symptoms, that we mean in the remainder of this article to direct the reader's attention. Where the disease is seated in the ascending aorta or its arch—portions of the vessel, which from their form and situation exposing them to the first concentrated impulse of the blood, are peculiarly liable to it—the morbid change appears much more commonly to commence as a true aneurism or general dilatation of the tube of the vessel in its whole circumference. Its inner coats may, however, subsequently give way, and the lesion will then present itself in the form of mixed aneurism, where a pouch of more definite outline surmounts the previous enlargement. The extent however to which dilatation of ali the coats is sometimes carried without rupture is enormous, the caliber of the vessel being occasionally twice or thrice as great as natural, or even more. These enlargements being commonly partial, present in most instances the ovoid or fusiform outline already spoken of, though sometimes even the entire vessel to its very bifurcation being strikingly dilated, the cylindrical form is more or less perfectly retained.

Sacculated aneurism takes its rise more ordinarily from the front or side of the vessel or from its arch than from its back part, where it is better supported by solid parts. In extreme cases it may attain to a magnitude much greater than that of the heart itself, and if directed upwards may by its pressure distend and even dislocate the sterno-clavicular articulation. Where planted near the root of the aorta, the rupture of the aneurism gives rise to the effusion of blood into the pericardial sac, as we should expect from the anatomical relation of the parts. The vessel in this portion of its course being destitute of the proper cellular coat, and the pericardial investment which supplies its place being comparatively little capable of distention, the dilated portion generally bursts before it has attained to any great magnitude, and often without passing through the form of either false or mixed aneurism. Sometimes again the rupture of the inner and middle coat is followed apparently within a few hours by that of the outer covering, and the case thus terminates fatally almost in its very commencement. Yet Scarpa was certainly in error in supposing this portion of the vessel altogether exempt from the sacculated form of the disease. Indubitable examples of it so situated have been recorded by Guthrie, Smith, Hanna, and others, in some of which the pouch was actually imbedded in the parietes of the heart, whilst the aperture by which it communicated with the vessel was placed either in the sinuses of the aortic valves or only a very few lines higher up. The re-action of the vessel on its contents, by which the blood receives at every systole of the artery a retrograde impulse towards the valves, has been suggested by Mr. Smith as the cause why aneurism of this part is always directed downward towards the heart; and an additional and perhaps equally influential reason may be found in the form of the enveloping pericardial sac, which from its pyriform shape leaves much more facility for the descent than for the ascent of the tumour.

There is a very rare form of the disease, generally described under the name of the "*dissecting aneurism* of the aorta," in which the blood is found extensively diffused between the middle and outer coats, which are thus separated occasionally for the length of several inches. In such cases it is generally found on examination that the blood has made its way out of the canal through a large fissure embracing a considerable portion of the circumference of the vessel, and generally either at right angles to its axis, or very irregular, so as to allow the impelled fluid to play at once upon a large extent of the connecting cellular membrane and rapidly overcome its resistance: whereas in the sacculated form the dilatation seems to commence on a much smaller scale, to proceed in a more gradual manner by the simultaneous distention and growth of the external coat, whilst the connecting cellular tissue having thus time to become consolidated, resists more effectually the insinuation of the blood between the adjacent tunics. Laennec mentions an instance

of dissecting aneurism where the blood had forced its way along the greater part of the extent of the aorta. The late Mr. Shekelton has described a still more remarkable variety of the disease, where the blood after thus detaching the two inner coats from the outer for some distance, re-entered the aorta again lower down; thus passing along for a certain way in an adventitious collateral canal, whilst the original channel was narrowed or obliterated by the pressure; and Mr. Smith speaks of a somewhat similar case where the additional complication of a subsequent rupture into the pericardium co-existed.

Aneurism of the Thoracic Aorta.

The *general* signs of this affection are commonly very obscure, many of them being almost identical with those of disease of the heart, in complication with which, moreover, as we have seen, it very often co-exists. The chief of these are such as originate in obstacle to the circulation and respiration — as palpitation, tendency to syncope, cough, dyspnœa occasionally in the form of asthmatic paroxysms, preference for the sitting posture, with the body bent forwards or a little to one side, so as to relax the parietes of the chest, hæmoptysis, frightful dreams and other evidence of cerebral congestion, together with a livid or otherwise unnatural complexion, and finally dropsy of the serous cavities and cellular membrane of the extremities. But indefinite as these general symptoms are, the difficulty is still further increased by many of them being often moreover altogether absent, very slight cough and almost unnoticed embarrassment of the respiration having in several cases alone preceded the sudden and unexpected fatal event.

Of the symptoms which are somewhat more characteristic, though obviously not absolutely peculiar to this lesion, are a sense of oppression, tightness, or wandering pain in the chest, tenderness on pressure in some of the dorsal vertebræ, together with pain of a boring kind in the same situation, and occasionally lancinating thence through the chest and towards the neck, shoulder, and arm, along with numbness, a creeping sensation and loss of power in the latter, and swelling both there and in the corresponding side of the thorax — effects of the pressure of the aneurismal sac on the brachial plexus, subclavian artery, and vein. Weakness or total absence of the pulse at one wrist, more commonly the left, is not unfrequently observed, together with difficulty and pain in the act of swallowing, from the pressure on the œsophagus, the latter being most apt to occur where the aneurism is seated in the arch or descending aorta; a whispering or croaking voice, together with a deep-seated wheeze or a sibilant character of the respiration from narrowing of the trachea, retraction of the larynx, and compression of the recurrent nerves.* There is often, likewise, marked impair-

* *Resilience of the pulse*, produced by the resilience of the aneurismal tumour after each beat of the heart, has been pointed out by Dr. Billing (*Med. Gazette*, December 14, 1833,) as a sign by which aneurism in the chest may be discovered in its incipient state. While the resilience is as yet slight it requires, he adds, some practice to feel it, and the finger must be kept with a light elastic pressure on the artery at the wrist. It is said to be perceptibly different from the double pulse sometimes connected with valvular disease. Its presence in the arteries, both of the upper and lower extremities simultaneously, might, we apprehend, become an index of the aneurism being seated near the commencement of the aorta or in its arch; whereas, if it were observed only in the pulse of arteries coming off from the aorta in a subsequent portion of its course, it might render it probable that the disease had its seat somewhat lower down.

We have already alluded to Dr. Billing's early advocacy of the dependence of *both sounds* of the heart exclusively on *valvular tension*, but are induced to recur to the subject here from having just noticed a new and able statement of his arguments in favour of this view, in the *Medical Gazette* for April 3, 1840. "I contend," he says (in opposition to Dr. Hope and others) "that the first sound as well as the second is entirely valvular, and deny that any part of it depends on muscular noise . . . . for when there is simple hypertrophy (increase of muscle and muscular action) there is diminution of sound, although more of the condition necessary to 'bruit musculaire,' . . . . it is the valves being encroached upon, and their having less blood to stretch them, which prevents their producing the usual sound. Again, where there is moderate hypertrophy with proportional dilatation, there is not appreciable increase of sound . . . . as the valves are in their usual relative condition. Again, where the heart is enormously enlarged by hypertrophy and dilatation, in which cases there ought to be enormous first sound, if 'bruit musculaire' were a cause, there is none, or scarcely any, because the openings are so

ment of the vesicular dilatation in one lung from the obstruction of the corresponding bronchus, but which may occasionally be momentarily overcome by making a very deep and forcible inspiration, whilst in the opposite lung the breathing may be of a decidedly puerile character. To the importance of such a comparative estimate of the state of the respiratory murmur on the two sides of the chest in the recognition of thoracic tumours, attention has been particularly drawn by Dr. Stokes and Dr. Greene in their valuable contributions to the pathology and diagnosis of aortic aneurism. Sometimes each inspiration has at the affected part a peculiar puffing character, as if the result of several very short and rapidly successive respiratory efforts, but really depending on the intermittent compression of the air-passages by the pulsations of the tumour. The face is often remarkably swollen, in consequence of the compression of the cava descendens and other cervical veins; and from the same cause, there frequently exists, as pointed out by Dr. Stokes, an unnatural thickness around the root of the neck, which he supposes to consist rather in a general turgor of these vessels than on serous effusion.

With regard to the *physical* signs, it may be remarked, that as the disease progresses, there may usually be detected an unnatural dulness on percussion in the upper part of the chest, and most frequently just below the left sterno-clavicular articulation, along with an abnormal pulsation of an expansive character in the same situation, or else between the cartilages of the ribs, or beneath the sternum, or just behind the upper edge of the same bone. It is, however, occasionally only to be felt on thrusting the fingers down as deep as possible at the root of the neck, whilst the sterno-mastoid muscles are at the same time relaxed by bending the head forwards. The percussion of the sternum is in some instances productive of pain. If the aneurism arise from the ascending aorta, it generally presents on the right side of the sternum; but if seated on the arch, or innominata, it usually makes its appearance at the upper part of this bone, and towards the inner ends of the clavicles.

Auscultation generally reveals a bellows murmur of a peculiarly loud, rough and abrupt character, above the clavicles, and perceptible also in the carotids and subclavians, and sometimes for a short way along the back; whilst beneath the sternum it is of a more superficial or whizzing character, and is commonly inaudible in the region of the heart.

From the obstructed state of the pulmonary circulation, and the interference with the nervous functions of the lungs, congestion of the pulmonary tissue and pain is frequently produced, as well as extensive bronchial rales. The expectoration is sometimes bloody, and even sympathetic hæmatemesis occasionally takes place. The cough which so commonly accompanies these cases, is apt to come on in suffocative paroxysms — in some instances it has a ringing croupy

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dilated that the valves cannot act." As to the difference of character of the first and second sound, he says, " I have accounted for the difference of sound by the difference of shape of the auriculo-ventricular valves; their attachments are different; they are set in stronger rims: the sigmoid valves are merely attached in a tube as it were, whereas the auriculo-ventricular have a firmer and different attachment to the parietes of the ventricle, which being in systole at the time of tension, altogether a flatter and longer tone is produced. The second sound being admitted to depend on valvular tension, respect for Newton's doctrine of simplicity of causation should, he thinks, prepare us to recognise a similar origin of the first. He further shows that those who suppose the valvular explanation of even the second sound to have originated with Dr. Elliott, or to have been clearly advocated by him, are in error. Dr. Bryan also supported the valvular theory of the sound, but not so early as Dr. Billing. (See *Lancet*, January 1833.)

Whilst we readily admit that there is much force in several of the above arguments, and that they lead us to doubt whether we have not somewhat understated, in the text, the influence of valvular tension in augmenting and modifying the first sound of the heart, we confess we still find a difficulty in reconciling the very prolonged character of this sound with simple tension of the auriculo-ventricular valves, or in getting rid of the fact, alluded to at p. 262., of the continuance of this sound with a certain degree of strength, after the ventricles are emptied of their blood, and these valves otherwise completely incapacitated for action. Nor is extreme thickening of the muscular parietes of the heart, the condition which we should *à priori* expect to be the most favourable to intensity or rapidity of contraction, and sonorous vibration. It is, we think in the thinner and more expanded muscles, that " bruit musculaire " has been most generally audible.

character, a sense of retraction of the trachea and larynx being produced by the tumour, and so much distress of breathing as to have given rise to the erroneous impression of the existence of an acute or chronic laryngitis in its final stage, and even to the performance of the operation of tracheotomy. The absence of pain in the larynx on pressure, and the circumstance of this part not being moved up and down so rapidly and extensively, should, as Mr. Porter has remarked, aid us in avoiding so gross an error.

Though the only *certain* evidence of the existence of aneurism is, to use the words of Dr. Hope, a tumour presenting externally and offering an expansive as well as a heaving pulsation synchronous with the action of the heart, still, when a large number of the signs and symptoms enumerated above co-exist, they will even without such pulsation render its presence highly probable, as it certainly is by far their most frequent source. It is plain, however, that some of them may also be produced by any tumour of a certain bulk, so situated as to compress the same organs as usually suffer from the proximity of an aneurism. Thus, when a large tumour presses on the heart, especially if in an hypertrophic state, or on the aorta or great vessels arising from it, it may transmit their pulsations to the surface, and so far simulate aneurism; and the resemblance will be still closer where the œsophagus or air-passages are simultaneously implicated; but on the other hand, the murmur, if any, will be of a much softer kind when it originates in mere compression of the vessels. It has been suggested that the diagnosis may be aided occasionally by observing the effects of exercise on the phenomena in question; for it seems probable, that in the case of aneurism they will become more prominent when the sac is most fully distended: hence in doubtful cases we should direct the patient to take a few rapid strides up and down the room in the interval of our examinations, and notice the changes so effected on the breathing, &c. Before forming our final judgment, all the possible causes of dyspnœa should be passed in review, such, for instance, as an hysterical habit, flatulence in the stomach or intestines, tumours of various kinds, as scrofulous glands, &c. pressing on the trachea or lungs, or on the nerves which supply these organs or the diaphragm. We have known the most obstinate paroxysms of periodic asthma, ascribed during life to organic disease of the circulatory system, to have their real source in an osseous tumour not larger than a pea imbedded in the substance of the phrenic nerve. In respect to dysphagia the knowledge of its occasional connection with aneurismal compression shows the necessity of great circumspection in all dubious cases where the employment of the probang is meditated.

Of the signs of thoracic aneurism, one of the most characteristic, after the expansive pulsation above alluded to, is doubtless the bellows-murmur or harsh rasping sound which is of a much more constant, abrupt, and rough character, as well as more localised or limited in its site, than that connected with anæmia and nervous excitement, and where present (for it is by no means an invariable accompaniment of the disease) serves often to disclose the precise situation of the tumour. It is louder than most cardiac murmurs, and the depth and hollowness of the tone is generally greater above the clavicles than below, which has been ascribed to its being reverberated through the chest before it reaches the ear. A vibratory thrill also is sometimes very perceptible to the hand applied over against the aneurism either in the upper part and front of the chest or in the back; but this is rarely the case till it has attained to a very considerable size, and either spread beyond the edge of the sternum, or caused the absorption of the corresponding portion of this bone or of the vertebræ and adjacent portion of the ribs. In dilatation of the arch of the aorta purring tremor *above* the clavicles is, according to Dr. Hope, an almost constant, and therefore very valuable sign. In the sacculated variety it is much less frequent. Where the parietes of the sac have become thick and unyielding, and lined internally with dense coagula, they will obviously be so much the less suited for generating vibrations calculated to affect either the hand or ear. "In all cases of dilatation, and the majority of sacculated aneurisms, the sound is

loudest above the clavicles, even though the impulse be stronger below." In the sacculated kind it is in some few instances louder on the side of the neck, opposite to that where the tumour exists; which is ascribable either to additional disease in the lining of the artery at a point beyond the aneurism, or, in other cases, to the remoteness of the mouth of the sac from the side which the great mass of the tumour occupies.

It was at one time supposed that the abnormal pulsation of aneurism might be distinguished with certainty from that connected with an enlarged heart, by the former being accompanied by only a single sound audible in the upper part of the chest, of an abrupt hoarse character, instead of having the gradual swell and fall of that produced by the heart, and by its diminishing in intensity as we descend towards the cardiac region. To the sufficiency of this latter part of the attempted diagnosis Laennec objected, apprehending that the second sound of the heart, especially when the organ is at all dilated, may often be sufficiently loud to be heard in embarrassing connection with the single sound of the aneurism. Dr. Hope, on the other hand, in the first edition of his work, expressed his belief that this difficulty may always be got over by attention to the peculiar character of the aneurismal sound, to the circumstance of its being often louder above than below the clavicles, and finally and chiefly to the assumed fact of the second sound, when audible, always increasing in intensity as we carry the stethoscope from the top of the sternum towards the heart, whilst the other sound becomes simultaneously feebler. As to the correctness of this supposed fact, there is, however, much room for doubt; for various recent observers have on the contrary ascertained that the aneurismal pulsation is occasionally double, and accompanied by a double sound of such a kind that the second part is absolutely louder near the top of the sternum than that heard opposite the heart itself.* This has been ascribed, and in some cases apparently justly, to the contact of the tumour with the heart, and the more vivid transmission of the sounds of the latter through the condensed walls of the sac than through the flaccid heart just then in its diastole. But in other instances, again, the heart and aneurism not being in close connection, this explanation fails, and we are then obliged to rest in that proposed by Dr. C. Williams, viz. that the sound is transmitted upwards from the semilunar valves, through the tense column of arterial blood. From the contiguity of the arch of the aorta and great vessels arising from it to the top of the sternum, this valvular sound is here generally actually louder, both in health and disease, than a little way lower down and nearer the heart, where the spongy tissue of the lung intervenes and deadens it. In the recent edition of his treatise Dr. Hope still maintains that aneurismal pulsation, though double, may readily be distinguished from the beating of the heart, inasmuch as the first aneurismal sound will be decidedly a morbid murmur, and therefore very different in character from the first sound of the heart. If there be no valvular disease this murmur will become progressively weaker as we descend towards the lower part of the heart; whereas the first cardiac sound becomes loudest here. But if the first sound of the heart, in consequence of co-existing valvular disease, be attended with a murmur, this must depend either on auricular regurgitation, or else on obstructive disease of the sigmoid valves. The first of these alternatives may be confidently rejected when the murmur is loud and distinct, at any part above the third rib. But if the murmur be loud and near-sounding at about an inch above the apex of the heart, a situation in which the aneurismal murmur would be nearly inaudible, we may feel certain on the other hand that such reflux actually takes place.

If the concomitant murmur be a semilunar obstructive one, the diagnosis is more difficult, but still generally practicable. The valvular murmur will be propagated, as we have already seen, two inches or more along the course of the vessel, whether the aorta or pulmonary artery, in which it originates—

* Williams, Stokes, Ferguson, &c.

but when considerably louder, and in a higher key, at two inches or more above the valves than opposite to them, we may conclude that it results from the roughened coats, dilatation or aneurism of the vessel. It being thus possible, continues Dr. Hope, to distinguish with certainty the first sound of an aneurism from the first sound of the heart, whether natural or with murmur, the presence or absence of the second sound of the heart on an aneurismal tumour is unimportant; "yet even this sound can generally be traced up, with a progressive increase of intensity, either to its immediate source, the semilunar valves, or to the line of the aorta and pulmonary artery, along which and the sternum it is propagated as far as the clavicles." "The second sound of an aneurism is occasionally attended with a feeble murmur arising from the expulsion of a portion of its blood by the elastic contraction of its walls during the ventricular diastole." (p. 443.) But this is easily distinguishable from the murmur of semilunar regurgitation, by the latter being audible along the course of the ventricles and by its being exceedingly prolonged, namely, through the whole diastole and period of repose. A diastolic mitral murmur would be too feeble to be heard in the situation of the aneurism.

Dilatation of the aorta. The loudest and hoarsest *aneurismal sound* is that caused by dilatation, and it is the more grating the rougher the interior of the vessel. "Where the dilatation is confined to the ascending aorta, the sound, impulse, and purring tremor above the clavicles are stronger on the right than on the left side; and the sound along the mesial part of the sternum, the tract of the ascending aorta, is often superficial, and of a whizzing character." *Purring tremor* is greater in simple dilatation than in sacculated aneurism, inasmuch as it is particularly favourable to the production of eddying currents; it is, moreover, permanent, restricted to the space above and between the sternal ends of the clavicles, and always accompanied by the peculiarly hoarse murmur already described; whereas the thrill occasionally connected with anæmia is feebler, occurs only when the heart's action is excited, pervades the adjoining arteries, and is accompanied by a murmur of a soft character, as well as by a venous hum in the jugulars. In dilatation *pulsation* exists above the sternal ends of the clavicles only, and on both sides simultaneously, though if the enlargement be confined to the ascending aorta, it is stronger on the right side than on the left.

Sacculated aneurism of the thoracic aorta has for its physical signs—1. "A pulsation, both above and below the clavicles, but usually stronger below. If the tumour occupy the ascending aorta its impulse is most perceptible on and to the right of the sternum, often with a visible intumescence of the parts. If it is seated in the commencement of the descent, the pulsation and swelling incline to the left side." 2. An abrupt murmur similar to that described under dilatation, only somewhat feebler, and less rasping. 3. A purring tremor above the clavicles, but very rarely below, unless erosion of the bones has already occurred. (*Hope*, 3d ed. pp. 441 to 456.)

To what we have already said on the diagnosis of other affections from thoracic aneurism, we may here add from Dr. Hope, that "*pulsating glands* or *other tumours* in the anterior mediastinum are not attended with the aneurismal sound, or only in a slight degree; no impulse and tremor are felt above the clavicles; and symptoms of a disturbed circulation either do not exist at all, or do not correspond in severity with the magnitude of the apparent disease. Enlarged glands or other tumours above the clavicles, receiving pulsation from a subjacent artery, rarely occasion sound; and if any exist it is a feeble whizzing. such as is produced by compressing an artery with the edge of the stethoscope. Both it and the pulsation are confined to the side affected. If the tumour can be grasped it will be felt not to dilate laterally during the ventricular contraction; and if it can be raised from the subjacent artery, its beating and whiff will cease entirely. An *enlarged heart* produces an impulse which is strongest at the apex, and decreases progressively on receding from it: the beating of an aneurism is stronger on the tumour than at some point

intermediate between it and the apex of the heart; and in most instances it is stronger than even the beating of the heart itself. Hence an aneurism distinctly conveys the impression of there being two centres of motion, the tumour and the heart. Finally, the ventricular contraction of an enlarged heart produces an ordinary sound, but is not attended with aneurismal murmur or pulsation above the clavicles." Varix of the jugular veins is distinguishable by the absence of sound and impulse, and by the compressibility of the tumour: but it it is to be remembered that their swollen condition may depend on the pressure of an aneurism against the descending vena cava, as well as that of any other tumour.

Aneurisms of the innominata, of the root of the carotid, and of the subclavian, where they have already attained to a considerable magnitude, are scarcely to be distinguished from those of the arch of the aorta. It has indeed been suggested, that from the circumstance of their producing impulse and sound only on their own side of the chest and root of the neck, they may be discriminated from the latter; but we apprehend that in practice this will often be found a very insufficient criterion, especially in respect to distinguishing them from aneurism of the commencement of the descending aorta and adjacent portion of the arch. Their true nature may, however, frequently be recognised with some confidence from their accompanying impulse, sounds, and thrill, being peculiarly superficial and distinct. The morbid murmur of subclavian and carotid aneurisms resembles, as Dr. Hope remarks, the blast of a small hand-bellows, rather than the hoarseness of a forge-bellows.

Aneurism of the *descending* thoracic aorta is generally much more difficult of recognition than that seated higher up, as there rarely exists any external pulsation indicative of its presence. The symptoms which occasionally point to it are pain in the corresponding portion of the back, a thrilling tremor imparted to the hand firmly applied there, and a hoarse single bellows murmur, much stronger in this situation than in front over the heart, together with impaired respiration in a portion of the lung, without any other evidence of pulmonary disease, as likewise dysphagia seated low down in the chest. The absence of such symptoms as are peculiarly indicative of aneurism of the arch or commencing aorta, as numbness of the arm, resiliency of the pulse, unequal pulsation at the two wrists, swelling at the root of the neck, stridulous respiration, may aid us still further in localising the disease in the descending portion of the vessel. A strong double jogging impulse, in the absence of adhesion of the pericardium, and of displacement of the heart to the front of the spine, is proposed by Dr. Hope as a new sign of an aneurism of the descending aorta, or other tumour situated behind the heart, so as to push it forward. When the descending aorta is the seat of the aneurismal tumour, the left lung is the most likely to suffer from its pressure, and it is into the pleura of this side that fatal hæmorrhage is most apt to take place.

Dilatation of the pulmonary Artery.

This is very rare. Its presence, according to Dr. Hope, may be ascertained when very considerable, by the existence of an abnormal pulsation, and purring tremor between the cartilages of the second and third ribs of the left side, together with an extremely loud, superficial, and harsh sawing sound, decreasing downwards towards the heart, and at the same time *not appreciable above the clavicles;* and the evidence will be greatly strengthened if there exist an obvious prominence in the above-mentioned situation.

A sacculated aneurism of the ascending aorta, if so large as to reach to the left side of the sternum, would cause so extensive a dulness, or so great an obvious tumour, that it could not readily be mistaken for the disease in question. Besides, in the former there would exist pulsation, murmur or tremor above the *right* clavicle also, or on the *right* side of the sternum, or above both clavicles.

Aneurism of the abdominal Aorta.

The aorta, in its passage through the abdomen, being, as well as its branches, closely embraced by innumerable nervous filaments proceeding from the solar plexus, the irregular or sacculated dilatation of any portion of the vessel is generally productive of a set of very painful and often extremely embarrassing symptoms, which vary remarkably in their site and character in proportion as the tumour increases in bulk and comes to press on new parts. There is scarcely any organ within this cavity, which has not, at one time or other, presented from this cause notable derangement either of a nervous or functional, or of an inflammatory character; and the concatenation of disorders has sometimes been so intricate, that we have known many of the first practitioners in Europe to have been consulted in succession without any of them even surmising the real source of the complicated evils. Thus a case of this kind has been alternately viewed as an instance of inveterate rheumatism of the lumbar and abdominal muscles,—as neuralgia of the sympathetic and associated nerves—as aggravated dyspepsia, obstinate constipation, and violent colic, or even stricture of the rectum—as hepatic or renal affection, diseased spine, or psoas abscess.*

From all this it is apparent that the *general symptoms* of abdominal aneurism are, especially when taken separately, in the highest degree fallacious and perplexing. There is often intense pain, though generally of an intermittent character, in the loins, lancinating occasionally upwards and forwards into the hypochondriac regions and abdominal muscles, and downwards into the testicles and lower extremities, the latter being at times cramped or convulsed, or at length even completely paralysed, as are likewise the bladder and rectum, where the tumour by its pressure comes to interfere with the functions of the spinal chord; and under the same circumstances even perfectly formed tetanic symptoms (opisthotonos and emprosthotonos) have been known to occur.

Where the sac is so placed as to be closely bound down by the crura of the diaphragm, acute pain is often felt in the attachments of this muscle all round, especially if the enlargement takes place in an upward direction; and as it often by its bulk greatly impedes its motions, and sometimes, moreover, bursts at length into the pleuræ, it is not extraordinary that severe pulmonary distress should occasionally be complained of, particularly in the latter stages of the disease. The liver is sometimes thrust down by it below the margin of the ribs, and many of the symptoms of even an acute hepatitis have been occasionally induced. One of the commonest features is vehement colic not unlike that produced by lead, of frequent recurrence, and aggravated by the constipation and flatulence so frequently present in this affection, as also by particular postures; and it has been ascribed, together with the occasional occurrence of nausea and vomiting, and pain and tenderness at the pit of the stomach, to sympathy of the alimentary canal with the injured coats of the artery, but with still greater probability to the pressure made by the tumour on the nerves of organic life. The pulse is unaffected throughout a great part of the duration of the disease, and the appetite in some cases very good, whilst the effects of indulging it are by no means productive of those rapidly injurious consequences which are sure to ensue where the same abdominal organs are the seat of idiopathic disorder.

Of the *physical signs*, the most characteristic, where it can be detected, is doubtless the existence of a fixed pulsating and somewhat compressible tumour in the course of the aorta, which can sometimes be very satisfactorily ascertained through the abdominal parietes, and even its outline traced out by the firm application of the stethoscope or points of the fingers over its confines, and this especially when the enlargement is seated in the front or sides of the

* See, in confirmation of this, the very interesting case of Mr. Mayne, by Dr. Beatty, in the fifth volume of the *Dublin Hospital Reports*, and various recent ones in other medical journals.

vessel, and not so high up as to be tightly tied down by the diaphragm. In making such an examination, the patient should be in the recumbent posture, with the knees and chest raised, so as fully to relax the abdominal parietes, and a period selected at which the stomach may be empty, and the bowels have been well cleared out by an aperient, especially if there is reason to apprehend the presence of scybala in the intestinal canal. It has been further suggested by M. Piorry, that by pressing firmly with one hand on the abdomen, and the other at the same time on the spine, we may form a tolerable guess as to whether there is a greater thickness of solid parts than natural, and still more accurately if we have recourse to the callipers used by midwifery practitioners. Percussion may also at times afford us material aid, by revealing a preternatural degree of dulness where the tumour is large.

By auscultation a bellows murmur of a brief and generally of a rough character is very commonly to be recognised in the epigastric region or lower down in the abdomen, and sometimes also in the corresponding portion of the spinal column: it may be conveyed downwards for some distance below the point where it originates, but rarely extends upward, so as to give rise to its being confounded with morbid sounds in the heart. It is sometimes accompanied here, as in other situations, with a vibratory thrill, perceivable on the firm application of the hand over the part. This sensation becomes most evident in those cases where the tumour has already caused the destruction of a portion of the vertebræ and heads of the adjacent ribs, and begun to form a distinct prominence in the dorsal or lumbar regions.

In some rare instances the pulsation of the tumour has been double, a phenomenon generally ascribable to its spreading upwards into close contiguity with the heart, and the consequent transmission of the action of the latter.

In respect to the bellows murmur as connected with aneurism of the abdominal aorta, Dr. Corrigan has observed, that in some cases where it is altogether imperceptible in the erect posture, it may be rendered quite distinct by causing the patient to assume the horizontal one,—a fact which he explains in conformity with his views of the mode of generation of this sound; namely, by the reduction of the hydrostatic pressure within the sac, the consequent relaxation of its parietes, and greater facility of vibration under the influence of the current-like motion of the blood simultaneously produced. According to Dr. Graves, by elevating the pelvis, and depressing the thorax, the intensity of this phenomenon, whether the pulsation be aneurismal or merely nervous, may be still further increased.

In regard to *diagnosis*, it must be recollected that abdominal pulsation may originate, as already intimated, under very dissimilar conditions, nervous, inflammatory, and obstructive, quite independent of aneurismal disease. When either the pulsation or the accompanying bellows murmur depend on scirrhous or other tumours of the viscera, stomach, pancreas, liver, &c. on the distension of the intestines by hardened fæces, or conglomerated masses of worms, the impulse will be of a less truly expansive character, as ascertained by the lateral application of the hand or stethoscope, and the sound of a less hoarse and grating kind. In case of the existence of fungus hæmatodes or other very malignant form of disease, the general aspect of the patient, the rapid wasting, and perhaps also the greater constancy of the pain in respect to site and duration, may afford useful aid in the formation of the diagnosis. Where the augmented pulsation is connected with the pressure and conducting power of a serous effusion in the peritoneal sac, the sensation of fluctuation, on striking the parietes, will serve to elucidate the true nature of the case. Though organic disease of the heart very commonly co-exists with aortic aneurism, yet in some instances it is only simulated, the organ being displaced, and its action deranged in a very remarkable degree, by the pressure of the tumour. Aneurisms of the branches of the aorta, as the cœliac axis, mesenteric arteries, &c. may generally be distinguished in their earlier stages from those of the aorta by their greater mobility.

When an aneurism has burst into the cellular membrane behind the peritoneum, an accident which has sometimes been survived for a very considerable period, pulsating tumours will manifest themselves in various situations, in the lumbar, iliac, or hypochondriac regions, with a corresponding increase of dulness on percussion, and a diminution of the previously existing circumscribed enlargement of the aorta. The magnitude to which ventral aneurisms sometimes attain before becoming ruptured is enormous: thus in a case recently detailed by Sir David Dickson in the *Medico-chirurgical Transactions*, the tumour which originated by a kind of neck from the back of the aorta about two inches above the cœliac axis, expanded over the whole abdomen with the exception of the cæcal region, and protruded in a conical form under Poupart's ligament, where it might have been mistaken for an aneurism of the external iliac artery.

Treatment of aortic aneurism. The two principal indications to be held steadily in view in the management of this affection, as tending in all cases materially to retard, and in some even to arrest its progress, are — 1st, to keep the action of the heart within moderate bounds — and 2dly, to reduce the quantity of circulating fluid without impoverishing its quality. It is under these conditions that the distending impulse within the tumour being restrained, whilst the capacity of the blood to coagulate and form firm and adherent fibrinous concretions is unimpaired, the current through the sac becomes limited, the parietes strengthened, and the best chance afforded for the filling up of its cavity with organised matter.

Quietude of mind and body, or rather the avoidance of all fatiguing exercise of either — the enjoyment of a pure air and easy gestation at frequent short intervals, so as to support the general tone of the system and promote the due performance of the secretory and excretory functions — a dry and moderate but not a very low diet — and attention to the state of the alvine evacuations, which are so often irregular (and not without great aggravation of many of the symptoms, especially where the aneurism is situated within the abdomen), — are points of great importance and very general application.

Where there is plethora of the system at large, congestion or inflammation in the lungs or any other important organ, the early but moderate employment of venesection is for the most part demanded, and either this or the application of leeches over the seat of the disease, together with the exhibition of digitalis, should be had recourse to where the aneurismal sac or the parts on which it bears become the temporary seat of increased action and augmented pain; and opiates and other anodyne remedies externally or internally employed, together with counter-irritants, will often prove valuable auxiliaries. With regard to leeching, however, there is a caution necessary — namely, not to practise it in those cases where the tumour has already advanced so near the surface that there is great tenderness along with redness or other discolouration of the skin, which has now become thinned and coherent, lest the irritation of the leech-bites might accelerate the sloughing process.

As to the propriety of enforcing the rigid plan of treatment practised by Valsalva and Albertini, which has already been alluded to in the section on hypertrophy of the heart, there has long been some difference of opinion. The voice of the more judicious part of the profession and of nearly all those who have of late devoted their attention more particularly to the treatment of cases of internal aneurism on a large scale, is we think at present decidedly adverse to its employment, except perhaps in individuals of a very robust constitution. We do not mean at the same time to insinuate that it is equally rarely applicable as an adjunct in the treatment of aneurism of the extremities, or in such situations as are within the reach of local applications; as ice, evaporating lotions, compression, and such other means as are daily employed by surgeons for reducing the size of pulsatory tumours and promoting the coagulation and organisation of their contents. In aneurisms of the aorta however, an extremely

lowering system is generally found to do more harm than good, by inducing arterial reaction, or a nervous and irritable state of the constitution incompatible with healthy reparatory action in any part of the system, by weakening the coats of the artery as well as by giving rise to a thin watery condition of the blood by which even the existing laminated concretions, so far from being augmented and consolidated by plastic lymph, are apt to get detached and washed away, one great bulwark against fatal rupture being thus speedily removed. In those rarer cases where the state of the general health and strength and the power of maintaining a rich state of the blood, almost in spite of an extenuating diet and reiterated venesection, are such as to induce the practitioner to recommend, and the patient to submit to the full employment of the Italian method, strict confinement to the horizontal posture and the most perfect rest must be simultaneously enjoined, along with unwavering perseverance for months in order to give this treatment any chance of success. Half measures here are worse than nugatory, as they would only impair the general health without holding out any rational prospect of beneficially modifying the local disease; whilst their precipitate renunciation after having been unnecessarily employed for a time, would soon give rise in its turn to the additional inconvenience of an artificially created plethora. Of the numerous cases supposed to have been cured in former days by Valsalva's treatment, not a few were probably altogether exempt from organic disease, the method of diagnosis being then very imperfect.

With a view to augmenting the coagulability of the blood the superacetate of lead in half grain or grain doses thrice a day, guarded if requisite with opium, has been occasionally employed in Germany and France, as well as in this country, with some appearance of benefit. Its effects must however be carefully watched, and any irritation of the gastro-intestinal mucous membrane subdued by the exhibition of oleaginous purgatives and other remedies appropriate to cases of poisoning by lead.

It appears incontestable, from several cases recently published by the most competent observers, that a tonic treatment, along with a reparative and rather generous diet, is in many instances much more applicable than the opposite; it has occasionally, indeed, been productive of the most marked and immediate relief of the intense neuralgic suffering, the colics, muscular pains, &c. by which abdominal aneurisms are so often accompanied; whilst a very lowering plan has seemed in the same individuals as decidedly injurious, both in respect to the severity of the symptoms and the progress of the disease towards a fatal result.*

In advanced and aggravated cases of thoracic aneurism, the paroxysms of dyspnœa, the harassing cough and dropsical symptoms which at length set in and add so heavily to the patient's sufferings, may often be for a time relieved by the moderate exhibition of mercury combined, according to circumstances, either with digitalis, squills, ipecacuanha, or sedatives, together with the occasional though very sparing employment of the lancet in moments of peculiar exasperation, especially when connected with inflammatory action. The use of purgatives as well as of diuretics is calculated to procure considerable temporary alleviation under some of the above circumstances.

The frequent co-existence of disease of the heart, often of a yet more hopeless nature than that of the aorta itself, is never to be lost sight of in the regulation of our treatment, any more than in the formation of our prognosis. But though this complication may prevent us from entertaining any the most remote hopes of curing the disease, still much may be done to render the remnant of existence more endurable, chiefly by the exhibition of such medicines as tend to moderate and regulate the action of the heart; and amongst the most influential of these palliatives, according to the recent clinical researches

* See Dr. Beatty's case, before alluded to; Dr. Frazer, cited by Dr. Stokes in the fifteenth number of the *Dublin Journal of Medical Science*; Dr. Graves, &c.

of Dr. Lombard of Geneva, and in conformity with previous experience, are to be reckoned assafœtida, camphor, and polygala seneka — remedies which, though peculiarly suited to those cases of palpitation or excessive action of the heart connected with nervous excitability, or dilatation and feebleness of the organ, are yet not inappropriate, even in those where the heart, though hypertrophied, has to struggle with an almost overpowering obstruction. To the debilitating system he is no less averse than was the late M. Dupuytren, and are most of the best recent British and American authorities.

DISEASES OF VEINS.

General observations on diseases of the veins and their functional derangement.

Diseases of the veins were long much overlooked; but have of late years, or since John Hunter drew particular attention to them, been investigated with great success by a host of distinguished pathologists.* The lesions to which they are subject differ very considerably in many respects from those of arteries, in consequence of their dissimilarity of functions and structure. Thus there is nothing in their composition analogous to the middle or yellow fibrous and elastic coat of the last-named vessels, with its marked tendency to disease and destruction from the deposition of steatomatous and osseous particles; and as all the venous coats are of a nearly equally yielding nature, when dilatation ensues it assumes neither the form nor local magnitude of the ordinary or sacculated species of arterial aneurism, but rather that of a general enlargement and flexuous elongation of the trunk of the vessel in a considerable portion of its course, as well as of its ramifications. The veins, moreover, are not exposed to the direct or pulsatile shock of the heart, and consequently the manner in which their enlargement is effected is very unlike that by which the arteries are dilated. Again, the veins are much more apt to contain puriform and other morbid matters than the arteries, both from a greater proneness, after slight injuries received, to take on and propagate the inflammatory action in a diffused form along their inner membrane; as well as from their connection with the function of absorption, and their office of returning the blood from the various organs often the seat of disease. And further, the blood coagulates much oftener, and more readily in the class of vessels which we are now considering, on account, probably, of its slower and more equable motion and its peculiarity of composition; and partly, it may be also, in consequence of a smaller supply of the nervous ramifications, and a lower degree of vitality in their coats, as well as from their greater proneness to the effusion of coagulable lymph, and the more frequent presence of pus, either of which may constitute a nucleus for the commencement of the transformation.

The functional derangements of the veins which, in conformity with the arrangement we have hitherto adopted, should precede their inflammatory and organic changes, have been already in part noticed in previous portions of this treatise, when speaking of the preternatural pulsation of the jugulars and veins of the extremities, and the remittent humming sound heard in the neck, &c. A continuous buzzing sound has occasionally been perceived in this last situation, and also below the sternal ends of the clavicles, where an aneurism of the aorta presses on the venous trunks in the upper outlet of the chest — and any other tumour similarly placed would probably have the same effect.

* We refer particularly to the contributions of Baillie, Hodgson, Brodie, Meckel, Otto, Davis, Travers, Lawrence, Dance, Ribes, Breschet, Carmichael, Velpeau, Maréchal, Rochoux, Blandin, Bouillaud, Lee, Gendrin, Piorry, Louis, Cruveilhier, Carswell, Ward, and Andral. For a great proportion of the facts in the summary of venous pathology, here presented to the reader, we are indebted to the *Anatomie Pathologique* of the last-named author (vol. ii. sect. 3.), an invaluable work, which should early be put into the hands of every medical student.

The veins throughout the body are sometimes, moreover, in an unnaturally relaxed condition, their calibre being modified to an unusual degree by variations of temperature; and they are further liable to be greatly over-distended, and even rendered varicose over the abdomen, legs, arms, &c. by the obstacle to the return of their blood which exists in cases of organic disease of the heart, or of pressure on any of their great trunks. But on these states, as being for the most part only symptomatic of disease in other parts, it is unnecessary here to dwell.

PHLEBITIS, OR INFLAMMATION OF VEINS.

Anatomical characters. — Secondary purulent deposits in organs. — Secondary organic inflammations and symptomatic fever. — Causes. — Phlegmasia alba dolens. — Treatment of phlebitis and phlegmasia dolens.

There has been the same difficulty in determining what anatomical proofs are to be admitted as decisive of the existence of phlebitis, as in the case of arteritis already treated of. The veins are even more prone to reddening by sanguinous imbibition than the arteries, both on account of their structure, and also of the greater quantity of blood generally contained in them in the moribund state, and after death. The hue thus imparted to them is, as we should expect from the colour of the blood within them, of a darker tint, and generally penetrates deeper, often entirely pervading their several tissues.

Anatomical characters. To establish indubitably the existence of venous inflammation, there must co-exist with redness of a lighter (more pinkish or browner) tint than that just spoken of, distinct vascular arborizations, or fine capillary injection in their walls, along with infiltration of their structure, the effusion of coagulable lymph or pus, or the existence of ulceration on one of their surfaces. The lymph so poured out may occupy either the exterior of the vessel, and so lead to its agglutination to surrounding parts, or else be poured out into the substance of its coats, or rather between them into the connecting cellular membrane, and so give rise to their morbid thickening; or finally, into its calibre, when, if in considerable quantity, it will necessarily obstruct the passage of the blood; or, if more thinly spread over its interior, it will assume the form of a false membrane lining its surface; and it is susceptible, under both these circumstances, of becoming at length organised into cellular tissue. It is thus that veins which have once been the seat of inflammation, are occasionally found converted into dense and impervious cords, whilst their office is supplied by collateral trunks in a state of preternatural dilatation. When the effusion is of a purulent nature, it may likewise exist in any of the three situations just indicated. If on the outer surface, the cellular membrane in which the vessel lies imbedded may become the seat of extensive suppuration; when it takes place, on the contrary, into the cavity of the vein, it often coexists with a coagulum of blood, by which the circulation through the vessel is stopped. The purulent matter is sometimes actually enveloped in the clot, and when thus situated has been supposed by Andral occasionally to originate within it, either by a process of transformation or of secretion; a supposition, however, which is still by many looked upon not only as merely hypothetical but unnecessary.

As to the pus so often found in the interior of the veins, it must be recollected that its source is frequently quite independent of inflammation of the coats of these vessels, being introduced into the torrent of the circulation either from ulcerated surfaces, or purulent deposits in other organs through which they pass, or from which they arise. Thus the veins returning the blood from an inflamed or cancerous uterus, from dysenteric ulcerations of the intestines, from a suppurating portion of the brain, from carious bones, or from joints or stumps

in which the suppurative process is going forward, very frequently contain such matter.

In many instances the puriform matter, whether it be taken up by the veins in the manner just indicated, or secreted from their lining membrane, or finally separated directly from the blood contaminated or altered in its constitution, is subsequently, as M. Dance, Rose, and others have shown, deposited in distant points of the system, as the serous cavities, the lungs, liver, spleen, joints, and cellular membrane, and more rarely in the kidneys, and even in the heart. The quantity of these deposits is probably, in some instances, still further augmented by a process of suppuratory inflammation, excited by the presence of the pus, (or contaminated blood) in the capillaries of the organs to which it is carried, as the pain occasionally felt during life, and the softening redness or ulceration of the adjacent tissues, sometimes observed on dissection, seem sufficiently to evince.

The lungs and liver, and especially the former, are the organs into which these secondary purulent infiltrations most commonly take place. They usually present themselves in the form of deposits, varying in size from a pea to a walnut, or somewhat larger, disseminated through the structure of those viscera, which are generally unnaturally red in their immediate vicinity. They differ from ordinary abscesses in being neither encysted nor concentrated into one place. According to M. Dance, the affected portions present, in their earliest stage, the appearance of local sanguineous infiltrations ; these subsequently have a very dark firm nucleus in their centre, which gradually becomes white and soft, and assumes all the characters of true pus. Whether the increased vascularity which surrounds these deposits is to be considered their cause or consequence, admits of dispute. M. Dance, like Mr. Arnott, is persuaded that whenever purulent deposits of this kind take place, phlebitis and an altered state of the blood arising therefrom, have always preceded and led to them. Their occurrence in the liver, in connection with injuries of the head (in which phlebitis, originating either in the injury done to the soft parts or to the bone, appears to be the connecting link,) had long ago attracted the attention of surgeons, but Morgagni had the merit of showing that the other viscera were not exempt from similar secondary disease in those cases.

Phlebitis is often attended with marked inflammation of the membranes of the brain ; and in several instances the eye has been rapidly destroyed, the cornea becoming opaque and the whole globe red and swollen, and eventually bursting or becoming totally disorganised : several examples of this destruction of the eye in the puerperal state have been recorded by Dr. M. Hall and Mr. Higginbottom ; and it has also been known to take place after the tying of the saphena, and after the inflammation and obliteration of the jugular vein.

An inflammatory condition of the organs from which the veins spring, or through which they make their way, become, not unfrequently, on the other hand, communicated to the coats of these vessels. This has been particularly observed, in respect to the cutaneous surfaces in which the local inflammation arising occasionally from even very slight injuries is, in certain states of the constitution, readily imparted to the lining membrane of the veins, and through their medium give rise to dangerous diffuse cellular inflammation. M. Ribes, in particular, speaks of having met with an inflammatory condition of the veins, characterised by redness, thickening of their coats, and a pseudo-membranous effusion lining their cavity, in cases both of simple and phlegmonous erysipelas ; and Andral has noticed a similar appearance in the vena portæ, in connection with disease of the liver and intestines.

Thus, then, it appears, inflammation of the veins may either be the cause or the consequence of inflammation in other organs ; and from the rapidity with which the diseased action spreads along their inner coat, and the facility of transport of morbid products in these vessels, it is evident how important a part they must needs play in the propagation of diseases ; and even their obstruction, though it may form a barrier against the further transmission of the

contaminating matters, becomes in its turn the source of a new set of evils, painful swelling of the parts beyond such obstruction, general dilatation of the collateral and subordinate veins, or even obliteration of many of the latter by the coagulation of the blood within them.

The local signs of phlebitis, when so superficially seated as to fall under the cognizance of our senses, are pain, greatly increased on pressure, swelling, stiffness, and occasionally redness, in the course of the vessel, generally extending upwards towards the heart in the direction of the current, more rarely spreading downwards, or in both directions. Where it has supervened on a wound in the vessel, as after the operation of venesection, a minute quantity of pus generally makes its appearance at the aperture; and after the inflammation has begun to abate, and the swelling at the surrounding cellular membrane has decreased, the indurated vessel may be felt rolling beneath the finger like a cord knotted at intervals.

The formation of matter is generally preceded by flying pains in different parts of the body, and accompanied by well-marked and repeated rigors.

The accompanying fever, especially in the advanced stage of the affection, is of a low or typhoid kind, characterised by great prostration, irritability, and anxiety, a very rapid pulse which soon becomes feeble and occasionally intermittent, hurried breathing, frequent nausea, meteorism, and tenderness of the abdomen, black sordes on the tongue and teeth, and muttering delirium, with a wild haggard look, and yellowish or discoloured skin. Such at least is a picture of the more aggravated cases as they draw towards their fatal termination. This form of fever, which bears a close resemblance to that induced by the injection of putrid matters into the veins, seems to occur especially in those cases where the purulent secretion becomes freely mingled with the blood so as to deeply alter its constitution, but doubtless may depend also in some degree in other cases on the rapid diffusion of the inflammatory process along the inner lining of the vessels. Mr. Arnott, however, has proved satisfactorily that the former is much the more influential cause of the two, for the worst general symptoms very frequently occur where but a very small portion of the vein is in an inflammatory condition. The larger the vein affected the greater is the danger, generally speaking, as the chances of its speedy obliteration and of the insulation of the purulent effusion and arrest of the inflammatory process are much less.

Causes. Phlebitis very rarely originates spontaneously, but may be almost invariably traced either to some injury done to the vessel itself, or else to the communication of inflammatory action from some contiguous tissue. Amongst its more ordinary causes may be enumerated all those operations in which veins of a certain magnitude are either wounded or tied, of which but too many examples presented themselves a few years ago, from the practice then prevalent of attempting to obliterate varicose veins by the knife or ligature. Instances of it are also not unfrequently afforded by the simple operation of venesection, especially where the lancet has been either blunt or dirty, or recently employed in operating on some diseased part, or where the incision having been made transversely, the orifice has long remained gaping or exposed to the air, or the limb been too freely used before the wound has perfectly healed. The state of the general health has also a marked influence in predisposing to the diseased action in question, and thus very slight injuries, which would have no ill effect in a healthy constitution, are often sufficient to induce this formidable disease in the irritable and unsound. Again, whether the suppurative or adhesive action shall predominate, and consequently the degree of danger attending the case, depend in a considerable degree on the previous state of the patient. It has appeared to M. Cruveilhier that operations or injuries affecting bones are peculiarly apt to be followed by venous inflammation. He has very often detected it after amputations in connection with profuse suppuration within the shaft of the bone, and along with the purulent deposits in distant organs already spoken of; and remarks that a large pro-

portion of the patients operated on in the Hôtel Dieu, are cut off more particularly by lobular pneumonia thus induced. The fatal erysipelatous inflammation of new-born infants seems occasionally to depend on suppuration within the umbilical vein, from the injury done to the cord after birth. Phlebitis is further known to originate in exposure to cold, either by a current of air directed against the limbs, or by standing long in cold damp situations. An instance where gouty inflammation was transferred to the coats of a varicose vein is upon record. One of the most frequent of the causes of phlebitis is indubitably the existence of ulcers, either on the surface of the body or in its interior, as in the bowels, uterus, &c. We knew of an instance where the careless introduction of the pipe of an enema syringe, so as to injure a tumour seated within the rectum, gave rise to a general swelling of the lower extremity and well-grounded suspicions of the existence of inflammation of the femoral vein; and a French writer mentions a similar result from the introduction of a catheter into a diseased bladder. Pressure, if firm and long continued, as by a tumour, a ligature round a limb, or other external cause, has likewise in many cases sufficed to induce inflammation in a subjacent vein, a circumstance the knowledge of which has been taken advantage of by Mr. Travers to effect the obliteration of varicose veins. Phlebitis in the superficial veins of the leg has ensued even upon a blow on the shin.

Phlegmasia alba dolens. Inflammation of the internal and external iliac and femoral veins has often been found to exist in puerperal cases, in connection with the disease of the lower extremity, commonly known under the name of Phlegmasia Alba Dolens. This affection, which commences within from one to five weeks after delivery, is characterised by a very painful elastic swelling of the limb, which, though unnaturally hot and exquisitely tender, is of a pale colour, whitish and shining. Unlike ordinary œdema, it does not pit on pressure. From the stiffness of the part, and the impairment of the functions of its nerves, the power of motion is almost or altogether lost. The affected leg is often twice the size of the other, the swelling generally reaching its height within forty-eight hours from its commencement, and being for the most part preceded by rigors and a sense of uneasiness in the loins, lower part of the belly or groin, and more rarely by well-marked peritonitic symptoms.

Sometimes, but rarely, both limbs are affected, either successively or together. There is commonly much fever, a rapid pulse, with headach, thirst, foul tongue, and nausea. The acute stage is generally over in about a fortnight, but the limb often remains swollen and feeble for a length of time after, and we have seen it continue so for life along with painful varicosity of the superficial veins and great suffering from all prolonged exercise or standing. In a very few cases the patient has been cut off in the early stage by the violence of the accompanying general symptoms. This affection was described by Mauriceau so far back as the end of the seventeenth century; though it is true pathology is still litigated, and the theories which have been framed to account for its nature and origin are very various. Puzos and Leveret fancifully ascribed it, in consequence probably of its colour, to the translation of the milk to the limb; White, and Brandon Trye, to rupture of the lymphatics, or their obstruction by the pressure of the head of the fœtus against the brim of the pelvis; and Dr. Hull to a general inflammation of the whole limb, its muscles, cellular membrane, and inferior surface of the true skin, and occasionally extending even to its great vessels, along with a rapid effusion of serum and coagulable lymph into the subcutaneous cellular tissue. Dr. Davis, M. Bouillaud, and Dr. R. Lee have endeavoured to show that the affection is altogether dependent on phlebitis, asserting that the iliac and femoral veins are invariably found, either containing pus, or thickened and contracted, or plugged up by a coagulum of blood, or by plastic lymph; and the last-named author believes further, that the inflammatory action is always imparted to the veins in question, by the uterine vessels in a similar state. According to M. Dance likewise, phlebitis has very often its origin in inflammation of the uterus after delivery;

but Velpeau supposes it to commence rather in suppurative inflammation of the pelvic articulations, and the subsequent introduction of pus from this source into the veins by absorption. Many pathologists, however, are still averse, and we think with reason, to ascribing such an exclusive influence to the veins in the production of the swelled leg of lying-in women, believing that they are only implicated in common with, or even subsequently to several other tissues, more especially the subcutaneous cellular membrane, the inferior surface of the cutis vera and the superficial nerves; for the swelling here, unlike that induced by the ligature of a vein, most frequently begins in the groin, labium, and thigh, and afterwards spreads downwards, in place of always manifesting itself first in the distal extremity of the limb; and it is accompanied, moreover, by an acute neuralgic tenderness diffused over the whole surface, and not met with in the same degree in cases of pure phlebitis, in which the pain and sensibility to pressure are more localised in the course of the vessels. Again, in phlegmasia dolens the swelling is not œdematous, but from the quantity of coagulable lymph poured out it is tense and elastic, and when the disease is fully formed rises immediately after pressure, and cannot be evacuated in almost any degree by puncture or incision; and finally, the type of the accompanying fever is very dissimilar to that in indisputable phlebitis, and the rate of mortality is incomparably lower.*

An affection of the lower extremities, somewhat similar to phlegmasia dolens, has been occasionally noticed after abortion, and likewise in connection with cancerous ulceration of the uterus, or after the removal of polypus from that organ, in elderly women †; and even in individuals of the male sex an analogous swelling of the limb has sometimes presented itself when individuals were labouring under inflammatory or organic diseases of the organs within the pelvis, as the rectum or bladder. Thus, Dr. Charles Forbes and Mr. Holberton have each recorded an instance of its occurrence in young men in the advanced stage of phthisis, where it probably had its source in ulceration of the large intestines, and the communication of the inflammatory action to the veins.

To Dr. Tweedie the merit is due of fixing the attention of practitioners on an inflammatory and very painful swelling of the limb, occurring in or after fevers. ‡ It had previously been cursorily alluded to by Dr. Cheyne of Dublin, and similar instances have been recorded more recently by Drs. Graves and Stokes. § It differs, as Dr. Tweedie has pointed out, from the passive œdema of the lower extremities, also occasionally one of the sequelæ of protracted fever, in being ushered in by rigors and renewed febrile symptoms, in generally attacking but one leg, which becomes exquisitely tender, and in commencing commonly in the upper part of the thigh and thence extending downwards, and in not retaining the impression of the finger. The swelling, like that in the puerperal state, is colourless. The superficial cutaneous veins are occasionally much dilated ||, and the power of moving the limb almost totally lost. It has been viewed by the author just named as an acute inflammation of the cellular tissue, demanding very active local antiphlogistic treatment. It has, though very rarely, gone on to suppuration, and is occasionally, as remarked by Drs. Graves and Stokes, complicated with inflammation of the cavities of the joints. A similar swelling has also been noticed in the upper extremity, in conjunction with intense pain and inflammation in the cellular tissue about the breast.

Treatment of phlebitis. From the state of depression which commonly exists, general bloodletting is rarely admissible. The free and repeated application

* See Dr. Johnson, in No. XXII. of the *Medico-Chirurgical Journal,* and in previous numbers; also Dr. Graves's *Lectures,*

† Lawrence, in *Medico-Chirurgical Transactions,* vol. xvi.

‡ Ed. Med. and Surg. Journal, vol. xxx. p. 258.

§ The earliest notice of it we have met with is Mr. Bellot's case, as detailed by himself in *Ferriar's Medical Histories and Reflections,* vol. iii. p. 187.

|| The distension of all the minute cutaneous veins was probably the source of the bluish tinge of the skin, in a case of phlegmasia dolens recorded by Dr. Stokes.

of leeches over the inflamed portion of the vein constitutes the chief part of the treatment, with which the use of mild aperients and diaphoretics is to be combined, and, in severe cases, the antiphlogistic influence of calomel in combination with opium or antimony, or both, ought early to be had recourse to; digitalis has likewise been recommended, but it is of much more dubious efficacy.

The affected part should be placed in the position most favourable to the return of its blood, and an emollient cataplasm applied; or, if more agreeable to the patient's feelings, an evaporating lotion, or water dressings, may be substituted. The local vapour bath, which has found recently so able an advocate in Dr. Macartney, would seem, from its soothing and relaxing influence, and from leaving the part free from all pressure, peculiarly suited to these cases.

The proposal of Mr. Hunter to effect the obliteration of the vein by means of pressure with firmly-applied compresses above the point of inflammation, has not, we believe, been generally successful, though it is still occasionally practised in France with another view, that of preventing the passage of the purulent matter into the general current of the circulation.

Where there is great sinking, bark, wine, and diffusible stimulants, together with beef tea, jelly, and other light nutriment may be requisite, even while the local depletory treatment already recommended is being put in practice.

In *phlegmasia dolens*, no less than in pure phlebitis, the early and frequent topical abstraction of blood, by the application of leeches in large numbers (20 to 40), over the femoral vein, as it passes from underneath Poupart's ligament and along the inside of the thigh, is the leading indication, along with which assiduous fomentations are generally advantageously combined, though to some patients cooling applications are more soothing. From the known influence of mercurial ointment in moderating erysipelatous inflammation, its trial has been recommended also in phlebitis, and in the acute cellular inflammation so often connected therewith; and in consequence of the morbid state of sensibility of the cutaneous nerves which marks phlegmasia dolens, and the peculiar inflammatory swelling of the limbs after fever, Dr. Graves has been led to combine it with one eighth part of the extract of belladonna, applying them on lint over the whole extent of the limb, whilst he, at the same time, freely exhibits opium internally (iv to vi grains in the twenty-four hours), or Dover's powder, and endeavours to promote the secretions and slightly to affect the system by the Hydrarg. cum Cretâ given thrice a day.

When the disease in the limb has passed into the chronic or indolent state, blisters, frictions, and bandaging are to be had recourse to, in order to promote the absorption of the remaining swelling.

VARICOSE VEINS.

Causes, effects, and treatment.

The irregular knotty enlargement to which the veins, especially the more superficial ones, which are least supported by external pressure, are liable, may originate in any permanent obstruction in their course, whether from inflammation in the vein itself or pressure on its outer surface; as, for instance, by the gravid uterus, a diseased liver, indurated glands, aneurismal tumours, &c. or, if more general over the body, in obstacle to the passage of the blood through the heart or lungs, or in universal relaxation of the coats of these vessels.

The veins arising from a cancerous part, or one in a state of chronic inflammation, are usually much dilated, and the appearance so produced forms an important feature in the external physiognomy of such morbid states. Obliteration of the deeper-seated veins by inflammation of their parietes, by tumours,

malignant diseases, &c. give rise to an unnaturally swollen and prominent condition of those near the surface, and thus a valuable indication of disease in internal organs, out of the reach of immediate examination, is occasionally afforded. — Thus, for instance, in obliteration of the superior cava, as has been remarked by Reynaud, the intercostal and mammary veins are seen dilated and freely anastomosing with those from the head; whilst, if the cava inferior, or vena portæ, is obstructed, the epigastric and external abdominal veins are greatly enlarged. The vena cava, azygos, and other internal veins have occasionally been found in a varicose state. A similar condition of the jugulars in the neighbourhood of the clavicles has sometimes, on insufficient examination, led to an erroneous suspicion of arterial aneurism.

Varix was supposed by Mr. Hodgson to be connected with rupture of the valves of the veins, but this opinion has not been borne out by later anatomical examination. (*Stanley.*) Where, however, the dilatation is already considerable, the valves will obviously no longer be capable of fulfilling their natural office of preventing the retrograde motion of the blood, and the ill consequences of their diseased state must then necessarily be much augmented. When varices of the legs are very large, the assumption of the erect posture has been known to give rise to fainting, in consequence of the sudden withdrawal of so large a quantity of blood from the centre of the circulation and from the brain, as was exemplified in a case recorded in Lower's work on the heart.

The enlargement of the calibre of the veins may be accompanied either by thickening or thinning of their parietes, or by both states at different points. The dilatation may either take place pretty equably throughout a considerable extent of their tube, which acquires, moreover, a tortuous outline from the simultaneous elongation of the vessel, or else may present here and there sacculated protuberances, or may be divided into loculi by septa crossing their interior: and further, these cells occasionally communicate by numerous small apertures with the surrounding cellular membrane, a state of things analogous in some degree, as Andral has remarked, to the natural structure of the spleen, and which is not unfrequently found in hæmorrhoidal swellings, though these may also consist in the simple dilatation of one or more veins.

A spontaneous cure of varicose veins, especially the sacculated variety, has occasionally been effected by the supervention of a slight inflammatory action in their walls, the effusion of lymph, the coagulation of the contained blood, and the consequent obliteration of their calibre. Varicosity of the veins necessarily gives rise to serious obstacle to the return of the blood, and, consequently, to œdematous swelling, weight, and numbness of the parts from which they arise, to inaptitude for active exercise, tendency to chronic inflammation in their coats, and to bursting of the vessel at its most prominent part, and hence to serious or even fatal hæmorrhage, as well as to very obstinate sores on the extremities.

Treatment of varicose veins. The palliative treatment has now almost entirely superseded the attempt at radically curing the disease by ligature, or cutting across, or excising a portion of the vessel, as practised a few years ago at so much risk even of life. Where the varicosity exists in the lower extremities, incomparably its most frequent seat, the person should avoid walking much, and still more standing long at a time; the limbs, when at rest, being kept in the horizontal posture, and the vessels at all times supported by elastic bandages, or laced stockings.

Where a sub-inflammatory state of the vein, or surrounding cellular membrane, has been accidentally induced, leeches and evaporating lotions, with aperients, a cooling diet, and perfect rest, will commonly afford speedy relief. Indeed, the importance of a temperate and rather dry diet, with a view to keeping the quantity of the circulating fluid moderate, along with attention to whatever may serve to improve the tone of the system generally, and consequently, also, in some degree, that of the diseased vessels, and the promotion of a due per-

formance of the excretory functions, are, in a chronic disorder like this which rarely admits of a perfect cure, obviously points of the first importance.

When sudden hæmorrhage occurs, the person must instantly be placed in the horizontal posture, and a compress and bandage applied over and *below* the aperture, so as to arrest the further escape of the returning blood. When ulceration ensues, the water dressing, or black wash (calomel and lime-water), covered with oiled silk to prevent evaporation, and retained by an evenly applied bandage continued from the foot upwards, form the best local applications. Where there is much thickening of the coats of the vein the tincture of iodine has been employed by Mr. Guthrie with advantage.

Mr. Mayo is still an advocate for obliteration of the vein, by the formation with caustic of a narrow transverse eschar of the integuments across its course, by means of which the adhesive inflammation is excited in its coats, and for the most part, according to his experience, without any serious accidents. Some other practitioners prefer having recourse to the effects of pressure by means of any hard substance firmly retained for some days, by tightly drawn adhesive plaister, or bandage, along the traject of the vein. We apprehend that the cases where either of these proceedings will effect a complete and permanent cure are rare, seeing that so many branches are commonly implicated, and that there is usually a marked tendency to the recurrence of the disorder. A plan which has recently been employed by Mr. Colles with considerable success, and which has the advantage of being unattended with danger, is to make permanent but moderate pressure on the saphena, where it is about to enter the femoral vein, by means of a spring compress so applied as to diminish the ordinary flow of blood through the superficial veins, and compel the deeper-seated ones to a supplementary action.

In varix of the scrotum Mr. Wormwald has succeeded in affording relief, by drawing the lower portion of the skin through a metal ring, so as to reduce the quantity of blood circulating in the part; whilst M. Breschet advocates the more hazardous practice of obliterating the varicose veins, whether in the cord or scrotum, by the graduated pressure of screw forceps, which soon produces an eschar at the point of application, and adhesive inflammation of the walls of the vessel and consequent obstruction of its canal.

MISCELLANEOUS AFFECTIONS OF THE VEINS.

Spontaneous perforation and laceration of the veins and of their valves. — Obliteration of their cavity. — Calcareous deposits. — Phlebolites. — Fatty tumours. — Gaseous effusions.

The veins, in addition to the lesions already alluded to, are further liable to *perforation*, with or without previous ulceration, softening, or wasting of their coats. The vena cava has been known to be burst or lacerated during violent muscular struggles and falls from a height. A similar event is said to have occurred in the rigors of an ague, and in a delicate female, mentioned by Portal, under the action of the cold bath. Large veins are occasionally penetrated from without inwards by the spreading of malignant ulcerations from adjacent parts.

The *valves* of the veins likewise are sometimes found *lacerated* or *perforated*, and when, in this state, there are often entangled in their fragments shreds of coagulated blood and of lymph—appearances for the most part indicative of previous inflammation of the lining membrane.

Independent of their obstruction by an inflammatory tumefaction of their coats, effusion of lymph, and coagulation of the blood within them, the veins are further exposed to *obliteration* by the pressure of contiguous aneurisms and

other tumours against their external surface. Their obstruction, however induced, is the usual source of partial dropsies, as of one of the limbs, abdomen, the side of the face, &c. as Bouillaud has ably demonstrated several years since.

Calcareous depositions are occasionally, though rarely, met with in the walls of the veins, and there is reason to believe that a predisposition to their formation is, sometimes at least, the consequence of previous inflammation. Both Morgagni and Baillie had seen them in the vena cava; Béclard in the femoral vein, when in contact with the corresponding artery, which was in an ossified state; and Dr. Macartney and Andral in the external saphena. The last-named author speaks of instances in which concretions of this kind, formed in the walls of the vessel, push the lining membrane before them, and thus project into the cavity, attached at length only by a narrow pedicle; and he suggests the possibility of the *phlebolites*, or loose pisiform, or oval concretions occasionally found within the veins, varying in size from a grain of millet to a pea, having their origin in this manner by the eventual separation of the slight remaining adherence. He suggests that they may also occasionally have their source in the coagulation of the blood and subsequent vital processes carried on within the clot; an opinion which has likewise been advocated with his usual ability by Dr. Carswell, as well as by Tiedemann, Otto, and Errhman. A small coagulum first forms, and in the centre of it appears a firm nucleus with concentric layers. This becomes gradually denser, the red part of the blood being absorbed, and calcareous matter deposited in the interior, till all the lamellæ have at length undergone the ossific change. The most frequent seat of these concretions appear to be the veins of the pelvic viscera, and the subcutaneous ones of the lower extremities.

Fatty tumours have been met with in the walls of the veins projecting into, and nearly obliterating their passage; and Andral speaks of having, in one instance, detected hydatids within the pulmonary veins of a man who had died of organic disease of the heart, but was not aware of any similar case on record in the human subject. In horses, however, and others of the lower animals, the occurrence of various species of entozoa within the blood-vessels is by no means very rare.

There is reason to believe that *gaseous matters* have been secreted in some very rare cases into the cavity of the blood-vessels during life, or else that they have separated spontaneously from the blood in a morbid state.* The vast majority of instances, however, in which such products are discovered on dissection, have their source in incipient putrefaction.

* See Dr. Mollan, in *Dublin Hospital Reports*, vol. ii. p. 329, and Dr. Reid, in the *Transactions of the King and Queen's College of Physicians*, vol. v. For examples of the secretion of air into the cellular membrane and serous sacs, see Valsalva, Ruysch, Frank, Laennec, Andral, Rebolle de Gex, and other authorities cited by Dr. Graves, in the twelfth number of the *Dublin Medical Journal*.

DISEASES OF THE ORGANS OF DIGESTION.

STOMATITIS, OR INFLAMMATION OF THE MOUTH.

Stomatitis aphthosa. — Anatomical varieties. — Aphthæ in infants — in adults. — Stomatitis mercurialis. — Symptoms and treatment. — Stomatitis ulcerosa. — Symptoms and treatment.

UNDER the generic term Stomatitis (from στόμα, the mouth) we shall include three species of inflammatory affections of the mouth, viz. Stomatitis aphthosa, Stomatitis mercurialis, and Stomatitis ulcerosa.

1. *Stomatitis Aphthosa.*

This form of inflammation of the mouth is distinguished by the appearance of white points or streaks, distinct or confluent, on the surface of the tongue, the interior of the lips, the cheeks, the gums, the palate, and the pharynx. These specks, called indiscriminately aphthæ (from ἅπτω, *accendo*), differ considerably in their anatomical nature. We shall describe the most important of these varieties.

1. The first, and perhaps the most common form, is an oval or circular elevation of the epithelium, having serum beneath it, and corresponding to a cutaneous vesicle; whence aphthæ in general are included in the class *Vesiculæ* of Willan and Bateman's system. When the epithelium is broken, and the mucous membrane thereby exposed, the latter may secrete pus, and the vesicle is thus converted into an ulcer.

2. In another variety the disease is seated in the mucous follicles, which, swelling with the inflammation and augmented secretion, raise the mucous membrane and epithelium above them into round whitish eminences; these aphthæ feel hard under the finger, and are often surrounded by a circle of redness. If the disease advances, the epithelium and mucous membrane covering the follicle are destroyed by sloughing, leaving an ulcer beneath. Aphthæ of this description are generally isolated, but when a great number of follicles are affected they may become confluent. Billard proposes to confine the term "aphthæ" to inflammation of the follicles, but the restriction is inconvenient.

3. We may recognise a third form of aphthæ in those white streaks and patches, without any perceptible elevation of the surface, which occur for the most part in persons of advanced age, or at the close of chronic diseases. They consist of portions of the epithelium which have lost their transparency. They often assume the appearance of small portions of white fur, adhering to the membrane. Sometimes they accompany the vesicular and follicular varieties.

4. The fourth variety of aphthæ is distinguished by a soft pulpy matter secreted by the mucous tissue under a peculiar form of inflammation. Whether the pellicle consists of concrete mucus or of albumino-fibrin has not been satisfactorily determined. This disease very frequently extends into the œsophagus and stomach, and has been observed by Billard even in the small intestine. It is known in France by the term *muguet*.

The distinction of the varieties of aphthæ thus sketched is founded on their anatomical characters. But they often co-exist: thus we find the vesicular aphthæ, and the inflamed follicles, occurring in the same subject, and as purely

local affections; and in children the pellicular inflammation and the confluent form of the second variety are often so intermixed as to be easily confounded.

In a practical point of view it is of less importance to determine, in any given case, the precise anatomical nature of the aphthæ, than the state of the general system. In our remarks on this subject we shall find it convenient to speak of the disease, first, as it occurs in the infant, and secondly, in the adult.

The infant is liable to two forms of aphthæ; the more common being that which occurs in the earliest periods of existence. It begins with an erythematous redness of the tongue, on the surface of which may be observed, after a day or two, a number of white points or streaks, consisting either of opaque epithelium or of concrete mucus. In mild cases the disease is confined to the tongue and the roof of the mouth, and subsides, under appropriate treatment, in two or three days. The attention of the nurse is generally first called to the affection by the reluctance of the infant to take the breast, or by its suddenly leaving off after beginning to suck with avidity. The exciting cause is some temporary disturbance in the stomach and bowels, occasioned by the quality of the milk, or by the improper use of other kinds of food. Antacid medicines, such as soda, magnesia, or chalk, with the local application of borate of soda, will generally put an end to the complaint, unless the food continues to be of an irritating nature. When the inflammation extends to the throat, the white points becoming confluent, and putting on the appearance of a creamy lining, there is commonly sickness, soon followed by diarrhœa, and attended with great restlessness and prostration. In this state a small dose of Hydr. c. Cretâ and rhubarb may be used at first, and afterwards mucilaginous liquids. The gastric and enteric irritation may be soothed by poultices applied to the abdomen. In some cases it may be necessary to leech the epigastrium, but this practice requires the utmost caution in subjects of so tender an age, and in a disease attended with so much exhaustion. When the vital powers are considerably depressed, we must administer broth, and even small quantities of wine, mixed with arrowroot or rice jelly. The aphthæ in such cases require the application of astringent substances diffused in syrup; five or six grains of sulphate of zinc may be added to an ounce of syrup of poppy, with which the parts may be frequently touched by means of a camel-hair pencil. This serious form of aphthous inflammation especially attacks children of sickly habit and ill-nourished. It has sometimes prevailed epidemically; and has also been known to rage in hospitals devoted to young infants. (*Dugès.*)

About the period of the first dentition, or later, infants are subject to aphthæ of the follicular kind, either distinct or confluent; the former connected with transient disorder of the digestive functions, the latter symptomatic of more serious affections, especially febrile attacks, and diseases of the lymphatic system. Although this kind of aphthæ is far more frequent at the period above mentioned, our experience leads us to think, with Dr. Evanson, that Billard was in error when he stated that it is never met with before dentition. (See *Evanson* and *Maunsell on Dis. of Children*, 2d. edit. p. 206.). The local treatment is the same as that recommended for the other forms of aphthæ, while the general measures must depend on the previous or accompanying disorders.

Adults are by no means so liable to aphthous inflammation as young children. The vesicles described as the first variety, are met with in conjunction with gastric irritation, and are not very easy to get rid of. It often happens that they are not discovered till they have been converted into ulcers, and are then scarcely to be distinguished from ulcerated follicles. Our first care must be to ascertain and correct the condition of the stomach and bowels, with which the aphthæ are associated. If they fail to subside under treatment thus directed, we must have recourse to local applications. Gargles containing chloride of soda, mineral acids, alum, tincture of myrrh, &c. are not without use; but the most decisive remedies of this class are the nitrate of silver, and the sulphate of copper, applied in substance to the aphthous ulcers.

The confluent follicular aphthæ, and those belonging to the third variety,

occur in the latter periods of exanthematous fevers, chronic visceral phlegmasiæ, especially those of the abdomen, the hectic fever of phthisis, and the breaking up of the constitution in carcinomatous or other structural diseases. Their appearance is inauspicious in all cases, but especially in chronic maladies. When they occur in clusters surrounded by redness upon the velum palati, the inside of the cheeks, or on the tongue, the pharynx being but little affected, the prospect is more favourable than when, as frequently happens, the base of the tongue, the palate, and the pharynx present a diffuse whiteness, looking as if they had been smeared with paint. The latter appearance is accompanied by signs of profound debility, a small fluttering pulse, colliquative sweats, and diarrhœa. But even this combination of symptoms is not invariably fatal, at least if the primary affection has been of short standing. The aphthæ attendant upon fevers are more commonly met with in autumn, and in humid atmospheres. In Holland an aphthous fever is sometimes epidemic, and the most frequent subjects of it are adults, and especially puerperal women. (*Guersent.*)

The *treatment* consists in using measures for supporting the strength, such as the exhibition of bark, wine, broth, jelly, &c. and in applying detergents and stimulants to the mouth and fauces. Ablution with warm water, whenever the patient's strength will admit of it, should precede the use of gargles. To the substances already recommended for the composition of these gargles, a sedative may be added, in the form of laudanum or syrup of poppy.

2. *Stomatitis Mercurialis.*

The inflammation of the mouth excited by the specific action of mercury is a serious adjunct to the *ptyalism* produced by this metal. Ptyalism strictly signifies increased secretion from the salivary glands, and it may occur quite independently of mercurial action, as an accompaniment of hysteria, hypochondriasis, and dyspepsia, but it is then very rarely attended with stomatitis.

The affection is generally preceded by an unpleasant taste compared to that of copper or brass, soon after which the patient complains that his teeth feel soft and tender when brought together, and he fancies they are loosened in their sockets. Soon after this, shooting pains are felt in the face, and a stiffness in the movement of the lower jaw, caused by tumefaction of the submaxillary and parotid glands. The gums are of a deep red colour, and their margins projected, as it were, from the teeth. Here and there we may perceive spots of a dull whiteness caused by opacity of the epithelium. The tongue is swollen, indented at the edges by the pressure of the teeth, and coated with a thick yellow or brownish fur: the breath has a peculiar fœtor, and often before the stomatitis is very manifest. In severe cases there is ulceration of the gums, commencing at the margins, and extending to the interior of the cheeks: occasionally the tumefaction of the salivary glands is so great as to prevent the mouth from being opened; this, together with the engorgement of the tongue may become so considerable as to induce suffocation. But without attaining so serious a degree, the stomatitis is productive of great distress, by the impediment to speaking, mastication, and deglutition, as well as by the profuse secretion of saliva. The patient often complains of it more bitterly than of the internal inflammation, for the removal of which the mercury was administered; and he can scarcely refrain from inveighing against his physician, for substituting so loathsome an affection even for a malady which threatened his existence. The local symptoms are generally accompanied by feverishness, and general irritation.

The duration of ptyalism varies with the extent and severity of the inflammation. If ulceration has taken place, the parts seldom recover themselves till several weeks have elapsed; and even without this, it may be almost as long before the spongy state of the gums, and the increased flow of saliva, entirely subside. Ordinarily however, when there has been only turgescence and soreness of the gums, the affection disappears in a few days.

The severity of stomatitis holds no direct ratio with the amount of the mercury introduced into the system. The enormous quantities requisite for inducing the specific effects of this metal in some subjects, are no less surprising than the sudden appearance of the affection, when only the most trifling doses have been taken. Some persons have, by idiosyncrasy, a remarkable susceptibility of mercurial influence, while others are as strikingly capable of resisting it. The constitutional liability, however, cannot be fairly estimated when inflammatory disease is present, for the most general fact with which we are acquainted as to the specific action of mercury, is, that the readiness with which it takes place is in an inverse ratio with the intensity of the existing disease. Other circumstances, also, very materially affect the result; such as the mode of administration, the state of the bowels, and of the function of the skin, previous bloodletting, &c.; but this is not the place for their consideration.

Treatment. In slight cases, very little more is necessary than to enjoin frequent ablution of the mouth, at first with tepid water, and afterwards with a mild astringent gargle, and to secure a free action of the bowels by saline aperients, and of the skin by warm clothing. When the inflammation is more severe, as indicated by a white line of suppuration along the edges of the gums, we must, in addition to the measures just mentioned, employ others of greater activity. If the tumefaction is general, leeches applied under the lower jaw, with fomentations, will afford relief. The best local application in our experience is the nitrate of silver, either in substance, or in a strong solution, (two scruples to an ounce of distilled water), by means of a small sponge fastened to a proper handle, or a camel-hair pencil. A lotion of chloride of soda will be very useful for correcting the fœtor, as well as for its stimulant property. An alum gargle containing laudanum is of service, when the active period of the inflammation has passed by. We have very little confidence in internal medicines exhibited as antidotes, such as sulphur and iodine. The supposed efficacy of the former depends, we believe, on its laxative operation. Opium in repeated doses has proved useful by quieting the erethism, and also, perhaps, by lessening the secretion from the salivary glands. But it must be confessed that the affection is very slightly amenable to treatment, excepting as to the progress of ulceration, which may be arrested with tolerable certainty by the nitrate of silver. The practitioner should never neglect to enjoin free ventilation of the patient's apartment, which, indeed, ought to be kept not only airy, but cool.

3. *Stomatitis Ulcerosa.*

Under this term we shall notice a form of inflammation of the gums, which appears in children between the first and second dentition. It is sometimes called cancrum oris, or a milder variety of that frightful disease which we shall describe presently, under the appellation *gangræna oris.* It would be better to confine both these terms to the latter disease, which is not merely more intense in degree, but distinct in its pathological nature, from stomatitis ulcerosa. This affection begins with inflammation of the outer surface of the gum, and more commonly in the lower jaw; sometimes limited to one side, but more frequently extending to both sides. The inflamed part is extremely swollen, and soon surmounted by a line of ulceration at the margin adjoining the teeth. The cheeks and lips become hard and œdematous, so as to impede the opening of the mouth; and this, together with the quantity of mucus and saliva collected between the gum and the cheek, renders it difficult to procure a satisfactory inspection of the diseased parts. The breath has a peculiar fœtor, allied to the taste called brassy or coppery, and quite distinguishable from the odour of gangrene. There is often considerable flushing of the face and conjunctivæ, with heat and tenderness; and the glands below the jaw are enlarged and painful. If the disease be not speedily checked, the ulceration may proceed so far as to lay bare the alveolar processes; but occasionally, we have

known it continue in an indolent state for several days, neither advancing nor disposed to heal. In some subjects, the ulcerated surface is very prone to bleed. More or less fever for the most part accompanies the affection, but is sometimes absent. The bowels are costive, and there is no inclination to food.

The disease prevails chiefly among the poorer classes of the community, and indicates debility of habit as a predisposing cause. The attack may be often referred to the immediate agency of cold, damp, or disorder of the stomach and bowels. When seen early, the prognosis is favourable, unless the disease has supervened upon some other acute malady, such as fever or scarlatina.

Treatment. Though the disease is inflammatory, it is not to be combated by the ordinary antiphlogistic measures. Leeches and cold lotions may be useful in reducing the glandular enlargements, but they cannot be depended upon for stopping the internal ulceration. The best applications for this purpose are of the same kind as we have recommended in the other species of stomatitis, such as the strong solution of nitrate of silver, and the mixture of syrup and sulphate of zinc. A linctus made with a drachm of strong muriatic acid, added to an ounce of honey, is an excellent remedy. We can also speak highly of a gargle composed of alum, decoction of cinchona, and tincture of myrrh. The only objection to this, as to certain other gargles, is, that the age of the child often prevents them from being used in sufficient quantity, or with sufficient frequency, to render them really efficient.

The internal treatment may be commenced by an emetic, unless the lips and cheeks are so swollen and tender as to render vomiting too distressing an action. After the emetic, a brisk purgative of scammony or jalap, with calomel or Hydr. c. Cret., should be administered. If there is much fever, we may exhibit salines and antimonials, but it is seldom necessary to continue them longer than a day or two. The action of the bowels may be maintained by castor oil, or rhubarb and soda. Should the ulceration, after the above treatment, show a tendency to spread, we must exhibit the sulphate of quinine, or decoction of bark, in doses suited to the age of the patient, continuing at the same time the local treatment with undiminished energy.

GANGRÆNA ORIS.

Synonymes.—Symptoms.—Causes.—Treatment.

Gangrene of the mouth may be the consequence of any of the forms of stomatitis, but the disease we are about to consider is idiopathic, or gangrene proper, beginning with that loss of vitality which in inflammatory mortification is the last of a series of morbid changes. The synonymes of Gangræna Oris are, *Cancrum oris, sloughing phagedæna of the mouth, water-canker, stomacace maligna, nomra, necrosis infantilis.*

Symptoms. The existence of this disease is generally first intimated by an indolent swelling of one cheek, without heat or redness. It is hard to the touch, and so little tender or painful, that the patient seems all but unconscious of it, and but for the enlargement being obvious to the eye, the mischief would probably escape notice altogether in its early stage. Indeed, as it is, the tumefaction is occasionally mistaken for affections of a much less serious description. The skin of the cheek has a peculiar glossy or waxy appearance. On examination of the mouth, we detect a whitish or ash-coloured eschar, without any inflammatory redness of the surrounding membrane; generally in the centre of the cheek, or in the commissure of this part and the lower jaw.

The gums look pale and spongy. There may be a certain degree of languor, dulness, or slight feverishness, but not less frequently there is nothing to call particular attention to the general health. Such are the principal phenomena of the first stage of the disease. As it advances, the slough spreads rapidly over the interior of the cheek and lip, and invades the gums. Saliva escapes in great quantity, at first clear, afterwards mixed with a dirty sanious matter which has a horrible fœtor. About the same time the outside of the cheek presents a pale ashy spot, which soon becomes livid and sphacelates. The extension of the disease to the bony structures is evidenced by the loosening of the teeth, which are soon thrown off with portions of the alveolar processes. The fluid discharged appears to have a corrosive quality, for the angles of the mouth and the lower lip sometimes become new centres of mortification. We have known both sides of the face attacked in the same individual, and there are cases on record in which all the soft parts of the face, as well as the upper maxillary bones, the palatal, the nasal, and even the ethmoid, were involved in the destruction. Usually, however, death prevents the lesion from extending so widely.

The constitutional disturbance is in many cases far from being proportionate to the severity of the local affection. The pulse is frequent, but weak: the bowels, at first confined, become towards the close of the malady extremely relaxed, and the heat of the extremities is much depressed.

Causes. The subjects of gangræna oris are children, usually between two and five years of age, but we once met with it in a girl who had attained her eighth year. It is confined to children of debilitated habit, and is very rarely observed among the richer classes; low marshy situations and rainy seasons appear to increase the predisposition. Not unfrequently gangræna oris is one of the sequelæ of exanthematous fevers. There is no good reason for attributing the disease to the specific action of mercury, though it may have sometimes supervened upon the latter, which, like any other cause of derangement, may have given the first impulse to the morbid process. It has often occurred when not a particle of mercury had been administered.

As to the pathology, we have already expressed our belief, that the disease is gangrenous *ab origine*. Any inflammation that may be found about the part is secondary only, bearing no causative relation to the gangrene. It has been stated that the commencement is often unattended by pain, heat, or redness. The swelling is the effect of the retarded circulation in the capillaries, and the infiltration of the tissues with serum, or liquor sanguinis. The pressure thus produced is sufficient to explain why the vitality of the central portion is destroyed. The mortification extends by contiguity, because the capillary circulation in the adjacent parts is necessarily affected by the pressure of the diseased tissue. If they have sufficient vital action, they may only suffer inflammation and suppuration, but it too often happens that the lesion assumes the same character as in the neighbouring part, being influenced by the same state of the general habit. It can scarcely be doubted that this depraved habit consists mainly in deficient plasticity of the blood. The worst case that ever fell under our notice, occurred in a girl recovering from mild fever, who had been leeched on the forehead. There had been extreme difficulty in restraining the hæmorrhage from the leech bites, in consequence of the incoagulable quality of the blood.

The *prognosis* is from the first unfavourable. Though the child may escape with life, it cannot be saved from disfiguration when the gangrene is once established. If, however, œdema has been discovered very early, and a vigorous treatment adopted, the danger may sometimes be warded off.

Treatment. On the first appearance of the swelling, the cheek should be frequently rubbed with a stimulating embrocation, consisting of camphorated oil and ammonia, and in the intervals should be kept moist with a tepid lotion containing muriate of ammonia and spirit of wine. A careful examination of the interior should be made, so that, on the detection of the slightest appearance

of an eschar, the part may be touched with the solid nitrate of silver, or strong muriatic acid. If sloughing has already commenced, the nitrate of silver lotion will be the best application. The mouth should be frequently washed out or syringed with a solution of chloride of soda, if only to moderate the fœtor. M. Billard recommends, that as soon as the livid spot on the exterior of the cheek shows itself, a crucial incision should be made into the centre of the swelling, and butter of antimony introduced, or still better, the actual cautery at a white heat. (*Malad. des Enf.* p. 247.) This remedy had been previously much insisted on by M. Baron. When the gangrene is complete, we must endeavour to stop its extension by carrot, or fermenting poultices.

The medicines to be exhibited are tonics and stimulants, of which carbonate of ammonia in decoction of bark, or quinine combined with camphor, are the most efficient. Wine or brandy may be liberally administered with beef tea; opium is strongly indicated not merely for allaying general irritation, but for the sake of the stimulating influence which it is known to exercise upon diseases of the capillary system characterised by debility. Constipation or diarrhœa must be met by the remedies appropriate to either state. The patient should if possible be placed in a large airy apartment.

DISEASES INCIDENT TO THE PROCESS OF DENTITION.

Local symptoms — in the mouth and gums. — Remote affections — in mucous membranes.— Skin. — Nervous system. — Fever. — Causes of difficult dentition. — Treatment.

THE development of organs and functions supplemental to those with which extra-uterine existence commences, is often productive of derangement both in the parts which are the seats of the new action, and in the general economy. The local and general disorders attendant upon the first efforts at menstruation, upon utero-gestation, parturition, and lactation, would sufficiently exemplify this statement; but the truth of it is perhaps still more forcibly illustrated by the morbid affections incident to the process of teething. To describe the various disorders which have been attributed to dentition, would be tantamount to treating of nearly all the diseases of infancy. So extensive a range of effects may be admitted if we view dentition as a predisposing cause, or as inducing a state of the system which more easily yields to the ordinary exciting causes of disease, such as vicissitudes of temperature, hygrometric changes of the atmosphere, improper food, &c.: but we must here confine our survey to the morbid states more immediately referrible to the process in question. These may be conveniently divided into the local and the remote.

I. *Local symptoms.* The local disorders of dentition are for the most part of a trivial nature when compared with the sympathetic derangements. Ptyalism, one of the most common accompaniments of teething, can hardly be considered morbid. It occurs not less frequently in infants who cut their teeth with ease, than in those with whom the process is more difficult. It is probable, indeed, that the free secretion of saliva relieves the vascular turgescence to which the mouth and gums are liable. We cannot, however, fall in with the general notion, that the constant humectation of the part favours the eruption of the teeth by softening the gums.

That the infant suffers from feelings of heat and probably an itching sensation in the gums, is intimated by the pleasure which it takes in the application of cold substances, such as metallic bodies, and in gentle triction by the nurse's finger. These sensations may be independent on much vascular fulness; but when the gums become swollen from congestion or inflammation, there is evidence of pain and tenderness, not only in the fretfulness of temper, the frequent

crying and starting from sleep, but also in the reluctance to take the nipple, or in the sudden retraction of the mouth after it had been applied greedily, from the promptings of hunger. In this state, the child may be noticed one instant thrusting its fingers into the mouth from instinctive attempts at relief, and the next suddenly removing them as if their contact with the gums had occasioned pain. These movements lead us to inspect the gums, which are found red, swollen, and sometimes drier than natural. This condition is most frequent when the teeth are near the surface, but it sometimes occurs even when they cannot be felt by the lancet, and is probably owing to the sympathy between the external parts and the vessels of the dental pulps, the latter being morbidly congested from irregular development. The inflammation of the gums is sometimes quite superficial, being confined to the mucous membrane, and is then apt to show itself in the form of aphthæ. (See *Stomatitis aphthosa.*

II. The *remote affections* may be grouped under the following heads:—1. the mucous membranes; 2. the skin; 3. the nervous system; 4. febrile affection.

1. The *mucous membranes.* Irritation of the lining of the nasal passages is denoted by frequent sneezings, and coryza. These catarrhal symptoms, accompanied by suffusion of the eyes and turgescence of the face, often lead to the idea that the infant has taken cold, and sometimes, when viewed in connection with symptoms of general disturbance, such as feverishness, loss of appetite, restlessness, &c., create a not unnatural suspicion that an attack of measles is impending. Sometimes the irritation extends to the air-passages, producing hoarseness, coughs, and wheezing. We have known in particular children these symptoms precede the appearance of almost every tooth, and subside immediately afterwards. Disorder of the gastric membrane is plainly indicated by the anorexia, sickness, and flatulence; and that of the intestines by diarrhœa, the stools being unnatural in colour and consistence, and by griping pains in the abdomen, the signs of which are screams, with sudden drawing up of the legs and depression of the anguli oris. Painful micturition, and soreness about the glans penis, the labia, and nymphæ, betoken irritation of the genito-urinary membrane. The several disorders enumerated are generally transient, but occasionally they degenerate into chronic diseases. Thus coryza becomes ozœna, epiphora runs into ophthalmia, catarrh into chronic bronchitis, &c. &c. But when this happens, there is an unhealthy habit of body, either congenital, or produced by external circumstances.

2. The *skin.* The cutaneous affections most frequently excited by teething, are, *papular*, as in strophulus and lichen; *erythematous*, as in intertrigo; *squamous*, as in pityriasis and psoriasis; *vesicular*, as in eczema; and *pustular*, as in impetigo and porrigo; or *vesiculo-pustular*, as in eczema impetiginodes. The papular and squamous diseases, for the most part, appear and subside with the successive eruptions of teeth; but the vesicular and pustular oftener remain during the whole period of dentition.

3. *Nervous system.* Under this head are included the most formidable effects of teething. We shall first notice the local nervous affections, and secondly, those which implicate the cerebro-spinal axis.

The local disorders show themselves principally in the form of spasm, affecting both the involuntary and voluntary muscles. As instances of the former, we may specify laryngismus stridulus, and spasm of the sphincters, producing retention of urine, and constipation. The first of these known by the name of *crowing inspiration* or spasm of the glottis, is often suddenly fatal. When fully developed, it is characterised by a stoppage of the breathing (during which the child either struggles violently, or appears death-stricken), followed by a long crowing inspiration. But approximations to this condition may be noticed, by a careful observer, in children who otherwise give no sign of disorder. Thus a slight sound of the kind alluded to, may be heard when the child wakes up from sleep, or when it has been excited to laughter. It should immediately direct attention to the gums, for teething,

though by no means the only exciting cause, is probably one of the most frequent antecedents. Perhaps we ought to place under the spasms of the involuntary muscles, that of the orbicularis palpebrarum, which is not uncommon. It is known by a partial closure of one eye, which in these cases is, we think, more reasonably to be referred to spasm of the orbicularis, than to paralysis of the levator.

Local spasms of the voluntary muscles are witnessed chiefly in the hands and feet. The flexors of the thumbs and toes are especially liable to the affection. Frequently there is no other token of irritation in the system than the rigid clenching of the thumb in the palm of the hand. Sometimes the flexors of the toes, and those of the carpus, are affected at the same time. These carpo-pedal spasms are occasionally seen in connection with a peculiar œdema of the dorsum of the foot and of the wrist, described by Dr. Underwood and Dr. Kellie; but the two affections may occur independently of each other.

The above local nervous disorders have been separately noticed, because they frequently occur singly, but not less often they are conjoined, and are even associated with the general affection to be next considered. We have distinguished them as local, because they are manifested in detached parts of the body; but we need scarcely inform the reader, that the irritation, which begins in the nerves of the dental pulp, is transmitted to the spinal marrow, and thence reflected along the nerves of motion.

Cerebro-spinal disorder, sympathetic with teething, may show itself under two very serious forms; eclampsia, otherwise called convulsions; and meningo-cephalitis or acute hydrocephalus. As these diseases so provoked, in no respect differ from those occasioned by other causes, we shall not enter into any description of them in this place. But cerebral disorder of a less formidable nature often occurs in the form of irritability of temper, wakefulness or uneasy sleep, and sometimes of torpor and heaviness. When such symptoms are accompanied by heat of the head, flushing of the cheeks, constipation and fever, the case may be readily taken for one of idiopathic inflammation of the brain, and not unfrequently it is really in the first stage of such disease. But the speedy subsidence of the symptoms after the removal of the irritation in the gums shows that the affection was symptomatic only.

4. *Fever.* The febrile affection in teething has nothing characteristic. Its elements are a quickened circulation, increased heat, and diminished secretions, especially of the perspiration and urine. It is nearly always attended by some one or more of the mucous or nervous disorders already adverted to.

As difficult dentition does not necessarily give rise to the remote irritations just passed under review, we may inquire in what consists the liability to be so affected? In many cases, the irregular teething itself is only a part of a general fault in the organisation, which renders the whole system more or less prone to disorder. In some, the tendency to mucous and cutaneous diseases is shown by the readiness with which they are excited by other causes, such as trifling errors in diet or changes of temperature. In other cases, the neurotic diathesis is strongly marked, and continues long after the work of dentition has been completed. It is not improbable that the afflux of blood towards the head, attendant upon the active nutritive processes in the jaws, may predispose to disorder of the brain. The immediate causes of the irregular development of the teeth are various. It may be retarded by the unequal ossification of the alveoli. Thus Guersent has seen them closed by plates of bone. (*Dict. de Méd.*) Rapid dentition is more frequently accompanied by disorder than a slower development; but we cannot easily determine in any given case, whether it is only a sign of general irregularity of organisation, or whether the excess of nutrition in the jaws is directly injurious, by subtracting from the proper degree of action in other organs. It is, however, quite obvious that if the growth of the teeth is disproportionate to that

of the jaws, the dental pulps must be subjected to a pressure which readily accounts both for the local and for the remote irritations.*

The treatment of the local disorders of teething is very simple. When there are signs of superficial tenderness, it may be sufficient to moisten the gums frequently with cold water, or to apply the *mel boracis* by the nurse's finger. Slight scarifications afford relief by the mere bleeding. But when the gums are spread and swollen, and there is reason to consider the growth of the tooth considerably advanced, while its emergence is impeded by the rigidity of the gum and the capsule, no time should be lost in making a free incision, which should be carried downwards till the tooth is felt under the lancet. When made upon a molar tooth the incision should be crucial. The relief ensuing upon this operation is often most striking. It will occasionally be needful to divide the gums even when there are no very obvious indications of local irritation, in cases presenting the sympathetic disorder swhich have been described above, and which from the absence of other causes we may consider referrible to teething. It is a very common error to suppose that if no redness or swelling of the gums is perceptible, there can be no necessity for lancing them; — as if the teeth could not as easily produce irritation when low in the jaw as when near the surface. The benefit resulting from the operation under such circumstances would be a sufficient answer to the objection; but we may remark in addition, that if it be allowed that the dental pulps may be the seat of morbid congestion or inflammation, to deny the utility of scarifying the gums for such an affection would be as unreasonable as to declare that no benefit could accrue from leeching the chest in pleurisy, or the abdomen in peritonitis.

The diet must be carefully attended to in all cases of irregular dentition. If the infant is robust and plethoric, or disposed to inflammatory attacks, it must be confined to the mother's food, or to milk and farinaceous articles. But we not unfrequently meet with cases of defective development, in which a more nutritious diet is strongly indicated. Such infants are to be seen among the poorer classes, pale, emaciated, ricketty, with shrivelled features, loose skin, flabby muscles, and enlarged lymphatic glands, while the teeth are in a state of abnormal forwardness. The change produced by generous diet in these subjects, and by a removal from town into the country, will often prove beneficial.

The treatment of the secondary disorders of dentition will be considered under their appropriate heads.

The irregular growth of the *permanent* teeth is a frequent cause of disorder both local and remote, and as such should always be borne in mind when we are treating patients during the period of the second dentition. Cases apparently very obscure and anomalous in their pathology, have had unexpected light thrown upon them by a consideration of the relative state of the teeth and jaws. Numerous instances may be found in Dr. Ashburner's lectures (*op. cit.*).

* The following Table, extracted from Dr. Ashburner's very interesting Lectures on Dentition (*Med. Gazette*, 1833-34), exhibits "the approximation to a normal order of eruption of the first dentition:" —

Periods.	*Teeth.*
7th month after birth	two central lower incisors.
8th	two central upper incisors.
9th	two lateral lower incisors.
About 9th or 10th	two lateral upper incisors.
... 12th or 14th	four first molars.
16th, 17th, 18th, 19th, or 20th	two upper canine.
23d to 30th	four last molars.

GLOSSITIS.

Symptoms —local — general. — Causes. — Treatment.

Inflammation of the substance of the tongue is far less frequently met with as an idiopathic affection, than as the accompaniment of other diseases. It has been observed in the course of exanthematous fevers, especially small-pox and scarlatina, and as an extension of disease from adjoining parts, as in Tonsillitis and Ptyalism. Membranous inflammation of the tongue does not require a separate consideration, being comprised under the general head of Stomatitis.

Symptoms. The local symptoms of glossitis are the same, whether it is primary, or only a secondary affection. The organ becomes hot, swollen, and painful towards the tip, the colour of which is of a deeper red than usual. The tumefaction soon extends to the body and the base, producing rigidity and difficulty in its movements, both in speech and deglutition. The surface is sometimes dry, and in other cases covered with a thick albuminous crust. As the disease advances the tongue acquires so great an increase of volume as to fill the whole cavity of the mouth, and even to project considerably beyond the teeth. By the swelling at the root of the organ dyspnœa is necessarily occasioned, as well as pressure upon the great veins of the neck, to a degree which sometimes threatens apoplexy. The progress of the disease is often frightfully rapid, the most extreme engorgement requiring only a few hours for its production.

If the inflammation is idiopathic, it is sometimes preceded by rigors and other symptoms of fever. The pulse at the commencement is quick, full, and hard. The skin also, and the secretions, denote strong phlogistic fever. But when the swelling has begun to impede the respiration, the pulse becomes feebler, and the skin is bedewed with cold perspirations.

The disease may subside by resolution, or terminate in suppuration or gangrene. The anterior part is most liable to gangrene, in consequence of the interruption to the circulation produced by the pressure of the teeth, a pressure which necessarily takes place when the organ is at once swollen and protruded.

The *causes* of glossitis may be those common to all phlegmasiæ, but the more specific are injuries inflicted on the organ by mechanical or chemical irritants. The effect of the former is often witnessed in epileptic patients, who have bitten the tongue during the convulsive paroxysm. The sting of insects, such as the wasp or bee, may excite a very alarming form of inflammation. M. Marjolin alludes to the case of a young man (a patient of M. Dupont) who suffered a severe attack after chewing a toad! (*Dict. de Méd.*)

Treatment. This disease must be regarded as dangerous, and requiring very prompt treatment. Blood should be abstracted from the arm, in quantity corresponding to the urgency of the symptoms; but the case must be seen early for this measure to produce much benefit. Local depletion is of the utmost importance; the tongue should be covered with leeches, and should the swelling notwithstanding advance, incisions must be made from the base to the tip, care being taken to avoid the ranular arteries. The relief from this treatment is generally very decided. It has the advantage not only of disgorging the capillaries, but also of giving exit to any collection of pus that may have been formed. As auxiliaries to the local treatment we may apply ice to the surface of the tongue, and a blister to the throat and neck.

Purgatives must be freely administered from the commencement, and when the deglutition is too much impeded to admit of their being taken by the mouth, we must resort to enemata. The enema colocynthidis will be useful under these circumstances.

If suffocation is threatened, a surgeon should be at hand prepared to practice tracheotomy. Mr. Benjamin Bell has related a case of glossitis from mercurial action in which the patient's life was saved by the operation.

PAROTITIS.

Specific variety.—Symptoms.—Causes.—Treatment.—Common variety.—Its symptoms and treatment.

Inflammation of the parotid gland may be conveniently considered under two varieties, the specific and the common.

1. *Specific Parotitis.*

This disease, vulgarly called the mumps, is characterised by pain and swelling of one or both of the parotid glands. The local affection is nearly always preceded by slight febrile disturbance. It first manifests itself by fulness and soreness at the angle of the jaw, impeding the movement of this part. By degrees the tumefaction extends towards the space between the cheek and ear, and also downwards, involving the submaxillary glands. On the fourth day it begins to subside; and during or after the decline it is not uncommon for the mammæ or testes to become painful and swollen. If the turgor of these parts or of the parotid itself is suddenly removed, we have reason to apprehend vicarious disease in the brain.

As this form of parotitis usually terminates by resolution, it is probable that the vessels of the gland are in a state of congestion rather than of inflammation. In strumous subjects, the disease is apt to lay the foundation for chronic enlargement and induration of the glands.

Causes. Specific parotitis is usually excited by contagion, but it sometimes appears under circumstances which forbid the supposition of such a cause, and yet it may be afterwards propagated in this manner. Analogous observations have been made on other well-known contagious disorders. It seems highly probable that the specific alteration of the blood may be induced by common causes, and that an emanation from this may take place, capable of inducing the same affection in other subjects. That the blood is implicated we infer from the previous constitutional disorder, and from the great tendency to metastasis. But before adopting this inference we must admit first that a tendency to metastasis indicates a diseased condition of the whole system, and secondly that this general fault (in acute disorders at least) has its seat in the blood.

Specific parotitis is one of those diseases which seldom occur more than once in the same individual, but many persons escape it altogether.

The *treatment* required is generally very slight. The part should be kept warm by flannel, and no attempt should be made to reduce the swelling by cold lotions. If the patient manifests an anxiety for some medicinal application, we may direct the flannel to be imbued with a weak solution of camphor in oil. The bowels should be gently relieved by laxatives, but violent purgation is to be avoided. The diet should be quite unstimulating, consisting chiefly of farinaceous substances and mild diluents; the patient must remain in the house, and avoid all risks of cold.

The swelling of the mammæ or testes requires the same kind of treatment, or rather non-interference, as that of the parotid, unless there are manifest signs of active inflammation; in which case depletory measures will be needed. Should metastasis to the brain unfortunately occur, the secondary disease must be attacked with the same energy as if it had been idiopathic.

2. *Common Parotitis.*

This form may result from exposure to cold; but when this happens we shall generally find that the first impression was made upon a decayed tooth, and that the parotid has been subsequently engaged. The swelling is very considerable, and attended with severe pain: the symptomatic fever sometimes runs very high. If the inflammation be not speedily got under, it will advance to sup-

puration, a process which in this part is extremely tedious. The abscess may break externally, or discharge itself into the meatus externus of the ear.

In a vigorous constitution the disease must be combated both by local and general depletion, and in all cases by leeching, conjoined with purgatives, diaphoretics, and low diet. Should the swelling not diminish under this treatment, we must endeavour by fomentations and poultices to hasten the suppurative process. When this is fully established, and fluctuation can be felt, the abscess must be opened. If the discharge continues, it will be necessary to sustain the patient's strength by tonics and a generous diet.

A less active but not less troublesome form of parotitis is often met with as one of the sequelæ of scarlatina, and occasionally of other febrile disorders. The swelling is hard and indolent, and generally extends to the glands of the neck. It requires leeching, fomentations, and poultices, and a degree of the antiphlogistic regimen, proportionate to the previous amount of disease and to the impairment of the patient's strength. A somewhat analogous form of subacute parotitis may be induced by cold in strumous subjects, and is very apt to degenerate into chronic disease.

ANGINA, OR INFLAMMATION OF THE THROAT.

THE term *Angina* implies inflammation of the parts bounded anteriorly by the velum pendulum palati and its columns, and posteriorly by the upper part of the pharynx. We shall consider it under three forms: *Angina Diffusa*, *Angina Membranacea*, and *Angina Tonsillaris:* the two first being distinguished by the character of the inflammation, the third by the part principally affected.

ANGINA DIFFUSA.

Varieties.— Symptoms. — Causes.— Prognosis. — Treatment.

IN this, which is the most common form of sore throat, the inflammation is seated in the mucous membrane covering the posterior fauces, tonsils, and pharynx. It is for the most part superficial; but in severe cases it may extend to the submucous cellular tissue. It is characterised by increased redness of the membrane and a greater fulness than natural. But the former may vary from the slightest possible exaggeration of the normal hue to the deepest crimson or the most vivid scarlet. When the tint is paler than usual, which sometimes happens, the appearance is owing to œdema. The tumefaction will depend partly on the degree of congestion, and partly on the amount of serous infiltration. In comparing angina diffusa with cutaneous inflammation, we should say that it oftener bears an analogy to erythema than to erysipelas.

There are three forms of angina diffusa. In one there is a bright red efflorescence of the throat, with tumefaction, and a copious secretion of mucus. In a second variety the membrane has a duller and deeper red, and is tense and dry. The third form is marked by relaxation and puffiness of the membrane, in consequence of serous secretion under the epithelium, or in the substance of the mucous tissue itself, or in the subjacent cellular membrane.

The symptoms, common to these varieties, are painful and difficult deglutition, a sense of soreness in the throat, irritation, or tickling, with frequent disposition to hawking and exspuition, a feeling of choking, and some impediment in articulation. The hearing is occasionally obscured by extension of the inflammation to the Eustachian tube. The second variety is often attended with more local irritation and distress than either of the others. The general symptoms of fever vary with the severity of the attack. Sometimes there is

considerable delirium when the fever runs high. The character of the fever is more frequently sthenic than typhoid, but it varies with the previous condition of the individual, or the epidemic constitution of the atmosphere. The third form is frequently exempt from fever, the others very rarely. This form is also more frequently met with as a chronic affection.

Causes. The most frequent causes of this form of angina are rapid variations in the temperature of the atmosphere, and the prevalence of humidity with cold winds, as in the spring season. Exposure of the feet or even of the hands to cold and moisture, when the body has been previously heated, will readily induce the affection in persons predisposed. Some individuals are attacked almost instantaneously on passing from a heated room or crowded assembly into the outer air. Angina may often be traced to endemic causes, such as a humid soil, the vicinity of stagnant water, a river-fog, &c. Some of the worst cases met with in practice are those in which the angina is an accompaniment of scarlatina. In many instances the disorder is secondary to gastric or gastro-enteric irritation.

The *prognosis* in uncomplicated angina is generally favourable. The cases which create most apprehension are individuals previously enfeebled, for in such subjects the accompanying fever often assumes a typhoid aspect. The local affection can seldom excite alarm, unless there are symptoms of an extension of the inflammation to the larynx. This is more likely to occur in the second of the varieties above alluded to.

Treatment. In slight cases, the exhibition of an emetic followed by a brisk purgative will often cut short the attack;—to which result the use of a pediluvium, and the application of a sinapism to the throat will effectually contribute. When notwithstanding such measures the inflammation increases, or if it has assumed an aspect of severity from the commencement, leeches must be freely applied to the exterior of the throat. If there is sharp symptomatic fever, general bleeding must be also practised. Antimonials and salines are useful auxiliaries. The best applications to the diseased part are warm water gargles, or the vapour of hot water impregnated with hops, henbane, or some other sedative. Stimulant or discutient gargles may do more harm than good in the first stage of the inflammation. But when antiphlogistic measures have been duly executed, and a state of relaxation or passive congestion only is left, or when the case has presented this character from the beginning, such remedies are applied with good effect. A solution of nitrate of potass in camphor mixture, to which laudanum should be added, may be used pretty early. Gargles of alum, muriatic or sulphuric acid, and tincture of myrrh are better adapted to a later period. Capsicum is deservedly much esteemed in the relaxed sore throat; but of all the local remedies there is none that can equal the nitrate of silver in applicability to all varieties and periods of the disease. Having already adverted to the excellence of this remedy in stomatitis, we need only remark that mere analogy would suggest its employment in angina. It has been mentioned that the inflammation sometimes terminates in suppuration. When this takes place a frequent seat of the collection is the loose tissue of the velum. But wherever formed it may require the use of the lancet, to give egress to the pus. This should be effected as soon as we can discern a pointing of the abscess, or perceive fluctuation by the finger. The neglect of a timely incision will cause a much greater extension of the suppuration.

Blisters are of service after leeching, or even before the latter, in cases which will not admit of even local depletion. They are especially indicated in the œdematous variety. When the disease is chronic, the elongation of the uvula is often so considerable as to produce tickling and cough, with mucous expectoration, whenever the patient lies down. The source of the irritation in these cases has often been overlooked, and the patient has in consequence suffered long courses of medicine and other remedies aimed at the fancied pectoral disease. The negative evidence of auscultation will often

lead to an inspection of the throat, and the real evil be thus discovered. The enlargement of the uvula is sometimes caused by actual hypertrophy rather than by mere œdema. In such instances the best remedy is excision.

ANGINA MEMBRANACEA.

Description.—Two forms, the sthenic and the malignant.— Causes. — Nature.— Diagnosis. — Treatment.

This species of angina is characterised by the formation of albuminous pellicles on the surface of the inflamed membrane, whence it was named by M. Bretonneau of Tours "Diphtheritis" (*διφθέρα, pellis*). The patches are of various extent, in mild cases white or ashy, separate, and presenting the appearance of superficial sloughs, for which they have often been mistaken; in others, dark-coloured, coalescent, and forming one uniform crust. The exudations may extend far down the œsophagus, or into the larynx, trachea, and bronchi, and upwards into the nasal fossæ. The membrane beneath and between the pellicles is in some cases of a bright red, in others purplish or livid. The exudations vary in density from that of coagulable lymph to that of a soft pultaceous matter.

The local sensations are similar to those of angina diffusa, with the addition of those produced by irritation and obstruction of the air-passages when the disease has extended in that direction. It is common also for the submaxillary and cervical glands to become inflamed and tumefied. The general symptoms are those of fever, and vary with the type of the latter, and the degree of the inflammation. When the patches are but few and circumscribed, the disease is often called *ulcerated sore-throat*, such as may be seen in scarlatina anginosa; but there are no ulcers in these cases, for on removing the pellicles, or sloughs as they are called, we find the membrane beneath quite free from any other disorganisation than the loss of its epithelium. In the worst cases the pellicles are discoloured by the admixture of bloody exudation, and vitiated secretions of the throat, so as to create an impression that the parts are in a state of sphacelus. These cases correspond to the angina maligna of many authors, and to the gangrenous angina of others; but we have the united testimony of Bretonneau, Guersent, and Deslandes, formed on extensive necroscopic observations, that there are no true eschars in these cases. The idea of gangrene existing has been further kept up by the discharge of serous fœtid matter from the nostrils, and by the putrid character of the fever. Instances of this description are very rarely met with, excepting when the disease prevails as an epidemic.

From the above remarks it may be gathered that angina membranacea appears in two forms. In one, the local affection bears the marks of active inflammation in the bright hue of the mucous membrane, and in the white circumscribed exudations, unmixed with blood or sanies. The constitutional symptoms in this form are likewise sthenic, the pulse being full and firm, the skin warm, and the nervous system, though disturbed, not exhibiting the signs of prostration so common in typhoid fever. The other variety may well be called *angina maligna*. Its approach is often insidious, being attended with but little pain or distress in the throat till the false membrane is already extensively formed. Then the dysphagia becomes extreme, liquids are forced back through the nostrils, and symptoms soon occur denoting that the air-passages are obstructed; such are a croupy cough, hoarseness, and stridulous breathing. The feeling of suffocation accompanying these symptoms is in part owing to the swelling of the lymphatic glands. On inspection of the throat we see a thick pellicle sometimes dense, not unfrequently pultaceous, variously coloured according to the degree of its decomposition or to the accompanying secretions, and either continuous, or interrrupted by fissures which exhibit the livid hue

of the membrane beneath. The pulse is extremely rapid and feeble, delirium sets in early, and is soon followed by coma; and the collapsed face and sunken eyes indicate extreme exhaustion. Death often takes place suddenly from the laryngeal complication. Bretonneau was led by the results of his dissections to attribute the death in all the fatal cases to the changes in the air-passages.

As might be expected *à priori*, the victims of the malignant angina are persons living in humid districts, where the disease is occasionally epidemic, the inhabitants of crowded buildings, and the poor ill-fed classes of the community. Persons, however, not under these depressing agencies, may be attacked by a severe form of the disease. Children are more liable to it than adults. In Picardy and Touraine the disease is all but endemial. In this country angina membranacea is far less frequent than on the continent. Whether it is propagated by contagion is not absolutely determined, but there are strong presumptions in favour of this view. When the affection is epidemic, the difficulty of distinguishing the operation of some generally diffused cause from that of contagion, meets us in this disease with the same force as in other epidemic maladies. The most unexceptionable instances of contagion are those in which the *sporadic* form has been transmitted from one person to another. Guersent relates the case of a nun who caught the disease from a little girl whom she had nursed in the Hôpital des Enfans, and he remarks that practitioners are frequently attacked after inspecting the throats of their patients.

Nature. That inflammation of the mucous membrane takes place in angina membranacea cannot be for a moment doubted, but why it should cause the secretion of coagulable lymph rather than of serum and mucus, which are the ordinary products of mucous inflammation, cannot easily be explained. It is probable, however, that the peculiarity does not depend upon the local action merely, but upon the state of the constitution previously modified by epidemic influences or by the unfavourable mode of life.

Diagnosis. 1. The fibrinous exudations in this disease, with the obstruction of the air-passages, has caused it to be confounded with croup, yet the diseases are very different. In the latter the inflammation is confined to the tracheal and bronchial membrane, while in diphtheritis the inflammation is seated in the fauces and pharynx, and only in severe cases extends to the larynx and trachea. True croup is rarely if ever attended with the low typhoid fever so common in angina membranacea, the symptoms of exhaustion in the advanced stage being clearly referrible to the impeded respiration.

2. Angina membranacea is with difficulty discriminated from angina gangrænosa, the affection described by Fothergill as putrid sore throat, the cynanche maligna of Cullen. The general and local symptoms are very similar, but in the latter disease the difficulty of breathing is attributable rather to the general tumefaction than to any laryngeal complication, and there are true gangrenous sloughs, which, on separating, leave corresponding concavities in the tissue. On this point Fothergill speaks very distinctly, and where the disease is of the mildest kind a superficial ulceration only is observable, which may easily escape the notice of a person unacquainted with it. A thin, pale, white slough seems to accompany the next degree; a thick opaque or ash-coloured one is a further advance; and if the parts have a livid or black aspect, the case is still worse. These sloughs are not formed of any foreign matter spread upon the parts affected, as a crust or coat, but are real mortifications of the substance; since, whenever they come off, or are separated from the parts they cover, they leave an ulcer of a greater or less depth, as the sloughs were superficial or penetrating.

In this disease, moreover, there is frequently observed an erythematous or papular eruption on different parts of the body; and there can be little difficulty in arriving at the conclusion that it is a variety of scarlatina maligna. (See Scarlatina.) We quite coincide with the opinion given by Dr. Tweedie,

in the *Cyclopædia of Practical Medicine*, art. SCARLATINA. "We are inclined," he observes, "to affirm that the scarlatina simplex, scarlatina anginosa, and the scarlatina or angina maligna, and the sore throat without efflorescence on the skin, are merely varieties of one and the same disease." It is scarcely necessary to add that the *sore throat* here alluded to, is that which presents the same characters as are observed in cases where there is also the cutaneous affection.

Treatment. Abstraction of blood both from the arm and from the vicinity of the diseased part, may be requisite in cases which set in with active inflammatory fever, and which are to be treated, therefore, on general anti-phlogistic principles. But the worst description of cases will not tolerate measures of this nature, and are exceedingly intractable under any plan. If the system can be brought speedily under the influence of mercury, the issue will generally be successful. This treatment, which was first practised at Tours by Dr. William Conolly, now of Cheltenham, is much commended by Bretonneau. Calomel may be given in two grain doses every second hour, or in smaller doses still more frequently. If the mucous membrane be irritable, we may administer the Hydr. c. Cretâ, and direct free mercurial inunction. If the pellicles have formed in the air-passages, very little expectation of recovery can be entertained. In cases attended with great prostration from the commencement, or when this state supervenes on the more active symptoms, we must have recourse to wine, ammonia, bark, and animal broths. In some cases we have thought that the combination of muriatic acid with dec. cinchonæ conduced materially to a favourable termination.

The local treatment is, to say the least, of equal importance with the general. Caustic applications are the most successful; Bretonneau strongly recommends the undiluted muriatic acid, applied by means of a sponge; but we have a far more manageable, if not more efficacious, remedy in the nitrate of silver, which may be applied in substance, or in a strong solution. It should be resorted to as soon as the false membrane is detected, or even before this is actually formed, if, from the prevalence of the affection, we have reason to think that the inflammation will become diphtheritic. Dr. Evanson has observed satisfactory results from a saturated solution of sulphate of copper. (*Op. cit.*) Blisters placed on the exterior of the throat, or on the nape of the neck, may be used as subsidiary measures, but must on no account supersede the internal applications. When the exudation of lymph has extended to the windpipe, we may attempt its detachment and expulsion by emetics, as in cases of croup.

ANGINA TONSILLARIS.

Superficial and deep-seated.—Symptoms. — Causes. — Treatment.

THE popular name of this disease, *quinsy*, is derived originally from *cynanche*, having passed through the several transformations of *esquinancie* (Fr.), *squinancy, squincy, quincy, quinsy.*

Inflammation of the tonsils assumes two forms, the superficial and the deep-seated. The former may be only a part of the angina diffusa, or it may be limited to the surface of the tonsil, in which case the inflammation usually dips down into the interior of the follicles of which the organ is composed; but in the common tonsillitis, the vessels in the body of the organ, most probably in the inter-follicular cellular membrane, are the seat of the disease. The inflammation is phlegmonous, and disposed to suppuration.

The symptoms of angina tonsillaris are a sense of fulness in the throat, pain, and difficulty of swallowing, heat and dryness of the fauces, and shooting pains in the ear. The voice has a croaking sound, which will often be quite sufficient to indicate the disease. On inspection of the throat, we see the isthmus faucium considerably narrowed by the projection of one or both amygdalæ, and the

surrounding parts more or less swollen, and covered with viscid mucus. The great vascularity of the tonsil will account for the rapid increase of bulk under the inflammatory turgor. In severe cases, the swelling is so considerable as to press upon the epiglottis, and impede the breathing.

The state of engorgement may continue several days, and at last terminate by resolution, or it may pass into passive congestion. When the inflammation continues active from the commencement, we may look for suppuration. This termination is often announced by throbbing in the part, and slight rigors. The distress produced by a large abscess in the tonsils can scarcely be surpassed in any disease. The fever accompanying this form of angina is often more active than might be expected from inflammation of an organ of comparatively little importance. The carotids and other arteries in the neighbourhood of the diseased part, pulsate with great force.

Causes. No peculiar predisposition seems to be required for the production of tonsillitis. It occurs among the most robust and healthy. The most obvious exciting causes are sudden changes in the temperature, and humidity of the atmosphere, exposure to cold when the body has been heated, currents of cold air, wet feet, &c. Persons who have once suffered an attack of the disease, especially in its suppurative form, are more liable to a recurrence of it.

There is no difficulty in the diagnosis, and we may generally prognosticate a favourable issue of the case. Death may result in enfeebled habits from the difficulty of conveying nutriment into the system; and when there is a large collection of pus, from pressure on the larynx. But such a termination in the latter instance may be almost always averted by art.

Treatment. If the case be seen at the very commencement, it will not unfrequently give way to the operation of an emetic. But we seldom have it presented to our observation before the inflammation has acquired sufficient activity to demand the free application of leeches. In vigorous subjects, a general bleeding will accelerate the cure. Brisk purgation by calomel and jalap or senna should follow the abstraction of blood. Saline cathartics are indicated from their antiphlogistic property, but the patient has great difficulty in swallowing them. Antimonial diaphoretics may be given at bed-time, but the comfort of the patient requires us to be as sparing of medicines by the mouth as the necessity of the case will admit of.

Incisions or scarification of the tonsils, though much extolled by some practitioners, have appeared to us to produce only a temporary relief to the state of engorgement. When pus has formed, the sooner it can be evacuated the better. Fluctuation should be felt distinctly before using the lancet, as premature attempts at letting out the pus occasion disappointment to the patient, and indispose him to the operation when it is more likely to be successful.

The progress of the suppuration may be encouraged by external fomentations and poultices, the inhalation of steam, and a gargle of warm water: the latter applications are very grateful even in the earlier stage. Although it is expedient to hasten suppuration when it has once commenced, we should do all in our power to prevent such a termination, and the best means for attaining this object are leeches and evacuants. Rubefacient embrocations and blisters may be used after leeching has been carried as far as appears desirable. We cannot say that discutient gargles are of service, except in chronic cases, or in those in which the inflammation partakes of a passive character.

HYPERTROPHY OF THE TONSILS.

An indolent enlargement of these organs, without pain, heat, or increased redness, may be referred to hypertrophy. It is not an uncommon result of repeated attacks of acute inflammation, or of inflammation chronic from the commencement. In strumous habits it appears to be all but congenital. The augmentation of size is sometimes so great as to produce constant inconven-

ence in swallowing and speaking. Various methods have been resorted to for reducing the swelling; such as repeated leeching, scarifications, blisters, astringent gargles, mercurial and iodine unguents; but with such partial success that the extirpation of one or both tonsils has been after all required. We have seen most benefit from the daily application of nitrate of silver, either in lotion, or in substance. We learn from Dr. Graves (*Dublin Journal*, Jan. 1839), that Mr. Cusack has been very successful in reducing these tumours, by applying the solid lunar caustic to successive portions of the surface, so as to produce an eschar at each application. This is done by pressing the caustic firmly upon the part, instead of lightly touching it, as in the ordinary mode of application. A cure by this method cannot be expected in a shorter time than six months.

DISEASES OF THE ŒSOPHAGUS.

Structural disease of the œsophagus. — Spasmodic stricture. — Symptoms. — Diagnosis. — Treatment.

This portion of the alimentary canal is remarkably exempt from acute diseases, —an indemnity which may be owing in part, to its organisation, which, besides being less vascular than in many other portions of the tube, is defended by a thick epithelium, and partly to the rapid passage of the alimentary substances, whereby those which have any irritating property are but a short time in contact with its surface. Inflammation may be excited in the œsophagus by acrid poisons; such as the concentrated acids and alkalies, corrosive sublimate, oxalic acid, &c.; or it may occur independently of direct irritation, as a continuation of disease from the fauces and pharynx. Thus it has been already remarked, that diphtheritic angina frequently extends to the œsophagus. But idiopathic inflammation commencing in this part, is we imagine extremely rare, inasmuch as authors are silent upon the subject, and we have never met with an instance of such disease.

The most important chronic diseases of the œsophagus are alterations of structure, producing an impediment to the passage of food. These causes of stricture may be arranged in three groups. 1. Hypertrophy of the submucous cellular tissue consequent upon chronic inflammation. 2. Carcinomatous disease in the form of dense scirrhus, or of encephaloid tumour. 3. Compression from tumours in adjoining parts, such as enlarged cervical glands, and aneurism of the carotid artery, or of the aorta. For further information respecting organic stricture of the œsophagus, we must refer the reader to works on surgery.

Spasmodic stricture of the œsophagus is characterised by difficulty of swallowing, the impediment being generally felt in the pharynx, or upper part of the œsophagus, and accompanied by a distressing sense of fulness and choking. The food may descend after some struggle in the part, or it may be instantly ejected. In many cases it matters very little whether the substance is solid, or liquid, in large quantity or small, the mere contact of it with the surface of the passage being sufficient to provoke the spasmodic constriction. In some instances, fluids have been transmitted with more difficulty than solids. The affection is sometimes paroxysmal, and may be accounted for by violent emotions, or by temporary disorder of the stomach. In other cases it continues for months, and even years. In one person the dysphagia is attended by increased sensibility, and even pain in the part affected, in another this is not the case. The complaint often disappears as suddenly as it came, and does not return. In other instances it gradually wears out like many other affections of a similar nature.

The most frequent subjects of this disorder are persons of the aneurotic diathesis; especially hysterical and chlorotic females, and those who have suffered from exhausting maladies. We have known it occur in women who have become anæmial from uterine hæmorrhage, or from large bleeding. It is not confined, however, to females. It has been met with in persons suffering from dyspepsia and torpor of the colon. Contiguous irritation, as from ulceration of the larynx, may give rise to the affection. A case of this kind is related by Mr. Mayo (*Outlines of Pathology*, p. 280.). It is not improbable that excrescences from the mucous membrane might produce irregular contraction, in a manner analogous to what occasionally takes place in the rectum.

The *diagnosis* of this complaint from organic stricture, is of vast importance with reference both to the prognosis and to the treatment. When it occurs in paroxysms there can be no difficulty in deciding that there is no structural impediment, but the permanent cases are more open to doubt. The introduction of a bougie will often suffice to remove any apprehension of mechanical obstruction; but its passage may be arrested merely by the spasm which its presence has excited. In some cases we shall find upon close inquiry that the part has been occasionally taken by surprise, as it were, and portions of food swallowed unawares, which could not have happened had there been a real obstacle. The sudden supervention of the disorder, its being accompanied by hysterical ailments, or alternating with them, the anæmial state of the patient, an age at which carcinoma does not usually occur, and the absence of the general signs of the cancerous diathesis, or of previous inflammation in the part, are considerations which may severally, or together come in aid of our judgment.

Treatment. The indications are, 1st, to lessen the morbid irritability in the œsophagus, and 2d, to correct the general predisposition, or that morbid condition in other organs with which this disorder is sympathetic. In fulfilment of the first intention, we may direct cold sponging and friction of the neck; the application of a blister, or a rubefacient liniment to the nucha, and antispasmodic medicines; particularly the fetid gums, camphor, castor, and valerian. The endemic use of morphia, or belladonna, may be tried in obstinate cases. The bougie should be frequently introduced for the purpose of habituating the part to stimulation, and thus diminishing its morbid susceptibility. It must be allowed. however, that in some patients this operation is productive of too much excitement to encourage its continuance, and we must then rely upon sedatives, antispasmodics, and the measures appropriate to the accomplishment of the second indication.

2. In cases of debility, from previous illness or other causes, our object will be to restore the strength of the system by a nutritious or even generous diet, a change of air, and the use of tonic medicines. The peculiar irritability of the nervous system in hysterical subjects must be lessened by the use of the shower bath, frequent exercise in the open air, a course of chalybeate medicines, regulation of the catamenial function, a firm but unstimulating diet, abstinence from tea and coffee, and the avoidance of modes of life calculated to excite or relax the nervous system, such as late hours, dissipation, excessive mental exertion on the one hand, or addiction to mere imaginative reading on the other. (See HYSTERIA.) When the disorder can be traced to irritation in the digestive system, the treatment of the former must obviously be secondary to that of the latter.

GASTRITIS.

Anatomical characters of congestion and inflammation of the gastro-enteric membrane. —Redness. — Forms of. — Cadaveric. — Physiological. — Morbid. — Congestive. — Inflammatory. — Brown colour. — Slate-grey, black. — Inference from the absence of morbid colourings. — Softening. — Induration. — Hypertrophy. — Ulceration.— Effusion. — Symptoms of acute, subacute, and chronic gastritis. — Anatomical characters. — Causes. — Treatment.

Though the term Gastritis in its strict acceptation implies inflammation of all the tunics of the stomach, it has been generally restricted to inflammation of the internal or mucous lining of the organ, the other tunics becoming in some instances involved, according to the nature and intensity of the exciting causes or the duration of the primary disease. Before detailing the symptoms of gastric inflammation, we shall give a brief account of *the anatomical characters of congestion and inflammation of the gastro-enteric membrane generally*, reserving for description in their proper places the appearances which belong to its several divisions.

Redness is a character appertaining equally to congestion and to inflammation. It cannot, therefore, enable us to discriminate these conditions; but in distinguishing cadaveric congestion alike from morbid congestion, and from inflammation, we shall derive much assistance from observing the forms and shades of the colouring. First as to the *forms* which it assumes: if the accumulation of blood is confined to the capillary network, the redness is diffused, and is called the *uniform* redness; when caused by vital congestion, it is for the most part of a vivid hue; when the smallest veins and arteries are likewise injected, the appearance is called *capilliform* or *arborescent;* the term *ramiform* injection is applied to cases in which the larger trunks are distended. When the redness is *punctiform*, separate villi are usually the seats of it, though the same dotted appearance is sometimes caused by minute circles of redness corresponding to inflamed follicles; when from the dots the colour radiates in fine lines, it is said to be *stellated.* This last is obviously a compound of the punctiform and capilliform varieties. The above appearances result from the blood contained within the vessels. The redness which occurs in stripes or patches, with no intervals of a paler hue, though it may be a circumscribed instance of the uniform species, is often caused by ecchymosis; whether it shall be accompanied by elevation of the surface, depends on the circumstance of the hemorrhage occurring in the villi, or in the sub-mucous cellular tissue.

Any one of these forms of redness may result from *post mortem* agency, or from causes in operation at the very time of death, viz. a mechanical obstacle to the return of the blood, or gravitation. But the uniform and punctiform redness, if so produced, will be attended by the capilliform or ramiform, because in these instances the cause acts not on the blood of the capillaries, as during life, but on that of the trunks. In estimating, therefore, the value of redness, as a sign of disease in the mucous membrane of the alimentary canal, we must particularly attend to the state of the venous system, and to the situation of the redness with reference to the position of the body. The condition of the vena portæ is of the greatest importance, and therefore it is a good rule to make a point of ascertaining the state of this vessel, as to fulness, before proceeding to lay open the canal; if it be not more distended than usual, we may feel satisfied that venous obstruction was not the cause of the redness. In like manner, if the redness is found in parts which are not dependent, we may dismiss the idea of gravitation.

Cadaveric redness generally occupies a very considerable surface, and if unmixed with morbid redness is not concentrated in particular spots; it is diffused over the part which it affects, and which will be found to be in the most dependent situation.

Having determined that the congestion was not cadaveric, we must inquire whether it was morbid or physiological. It is well known that during the process of digestion, more blood is determined to the mucous membrane than at other times; therefore the stomach of a person who had died shortly after a meal may be expected to exhibit redness. The same rule applies to a certain extent to other parts of the tube, the emptiest being *cæteris paribus* the least vascular. The kind of food must be taken into consideration, as to its stimulating quality, and we must inquire whether cordials had been administered recently before death. In numberless instances we have satisfied ourselves that the vascularity was caused by brandy or ether taken in the last hours of life.

The age of the individual produces important differences in the natural colour. Thus, as Billard has observed, in the fœtus and infant it is rose-coloured; in children, of a milky or satin-like appearance; in adults, of a slight ashy colour, especially in the duodenum and beginning of the ileum; and in elderly persons, still more decidedly ashy.

From what has been stated then, it is clear that redness is least equivocal as a morbid sign when it is confined to circumscribed portions of the capillary network; when it occurs in situations where gravitation would produce a contrary state; when there is no remarkable fulness of the portal veins; and when there is no evidence that the digestive function had been active just before death, or that stimulant potions had been recently taken. But it must be well known to all who have had much experience in *post mortem* examinations, that such a concurrence of circumstances is very rare; that the combined influence of gravitation and of mechanical obstruction occurs in a vast number of cases, and that their effects are complicated with those of disease, which they may heighten for obvious reasons. But if morbid redness accompanies the cadaveric, it will be found in some situations where it cannot be accounted for by such causes; for instance, although we might be in doubt respecting a patch of dull redness in the posterior region of the stomach, we have no difficulty in referring a punctated or arborescent redness in the anterior surface to a vital process. In determining whether though vital, it was normal or morbid, we must consider the circumstances which have been mentioned respecting age and the contents of the stomach; thus, before pronouncing the redness to be morbid in a very young subject, we must be sure that the hue is more intense than natural, and further that it is not an equable suffusion of the membrane, but belonging to the punctiform and capilliform varieties. The form of vital congestion most difficult to distinguish from the cadaveric, is obviously that which depends on the same causes as the latter; viz. the passive congestion, which occurs in states of great debility, or in cases of preternatural fluidity of the blood. But, as Andral observes, the passive hyperæmia, which is left after long continued irritation, and which is confined to the larger branches of vessels which had not recovered their natural contractility before death, is not so readily confounded with the pseudo-morbid species.

Having ascertained that the redness is the effect of disease, we might next inquire whether this was congestion or inflammation; but the question is not to be resolved by the character of redness, which depends merely on a condition common both to congestion and inflammation, viz. a preternatural quantity of blood in the capillaries. It might be presumed that as inflammation differs from congestion in the fact that the blood is stagnant in the former, its redness would be sufficiently distinguished by its permanency; but although in congestion the blood may not have been stagnant during life, its coagulation after death may imitate the characteristics alluded to. Redness is said to be permanent when it is not removed from a tissue by pressure, or by ablution, or by suspension in a vertical position; but there are other means of ascertaining inflammation.

The other colours indicative of congestion and inflammation are the *brown*, the *slate-grey*, and the *black*. They are characteristic of chronic disease, and

are, on the whole, much less easily imitated by cadaveric changes than redness; for the plain reason, that they require a longer time for their production. These shades are all owing to stagnation of blood in the capillaries, and to the changes which it undergoes, either by the loss of its serum, and consequently of its saline particles, or by the chemical action of the substances in contact with the membrane. The effect of acids, including sulphuretted hydrogen, in darkening the hue of the blood when extravasated is well known, and is exemplified in the evacuations peculiar to malæna. A similar action may occur in the textures, but most frequently in the stomach and cæcum, because a liquid acid is continually secreted in these parts; and, accordingly, these are the portions of the canal which oftenest present the brown and slate-grey tints. The dark crimson and black, depending often on mere stagnation of the blood, may be observed in every part of the canal, the former very commonly in the lower extremity of the ileum. We may remark, that some varieties in the forms which these colours present, such as the dotted and striated black, are caused by partial hæmorrhage in the mucous membrane.

Before dismissing the morbid colourings of the gastro-enteric membrane, we must consider the following question:—Does the absence of any of these appearances prove that no vascular disease of the part existed during life? As it regards inflammation the answer must be affirmative, because, if the blood had stagnated and coagulated in the capillaries, it cannot be removed by any forces which operate after death, short of actual decomposition. But the same cannot be said of mere congestion; and we believe it to be by no means uncommon for an intense congestion to disappear shortly before or after death in consequence of revulsion, or of hæmorrhage, or of serous effusion. Thus, a severe determination to the bronchial membrane in the last hours may remove the disease from the intestines; or a large quantity of blood or serum may have been voided by stool, leaving the membrane which furnished the fluid nearly pale.

Softening. Before pronouncing upon the value of this change as a sign of disease, we must be aware of the different tenacity of the healthy membrane in different parts. Thus, although it may be raised by the forceps in considerable flakes from the pyloric end of the stomach, and from the rectum, it readily breaks and tears in the other parts of the canal. In the duodenum and jejunum the disposition of the membrane in the valvulæ conniventes prevents it from being separated in large pieces. For the most part, the firmness is in a direct ratio with the thickness. The relative thickness of the membrane in its different parts, according to Billard, observes the following order; 1. duodenum: 2. pylorus: 3. cardia: 4. rectum: 5. jejunum: 6. ileum: 7. colon.

Preternatural softness may be cadaveric, as in the stomach from the action of the gastric juice; and in other parts, from imbibition of the blood in pseudo-morbid congestion, or from putrefaction. Morbid softness may also be caused by a similar infiltration during life, or by extravasation of blood into the substance of the membrane, as in what is sometimes called hæmorrhagic softening, and may have been preceded by mere congestion. Such kinds of *ramollissement* will be distinguished by the hue of the membrane. When softening has been preceded by chronic inflammation, it may be of a brown or even of a white colour. The latter is not uncommon in chronic diarrhœa, the villous coat of the large intestine being found white and pulpy, and easily denuded by the nail, or the handle of the scalpel.

Induration. This alteration is more common in the subjacent cellular membrane than in the mucous coat, and indicates inflammatory disease of some standing, as in chronic dysentery. But the mucous membrane itself may be firmer than natural, though it is nearly always at the same time hypertrophied. As the firmness is judged of by the ease with which portions of the mucous may be separated from the other coats, it must be borne in mind that a fallacy in this respect may result from the unnatural softness of the submucous cellular tissue, which must obviously facilitate the stripping operation.

Hypertrophy. This is one of the most striking characters of chronic mucous inflammation. It may be confined to the villi, producing velvety, or fungoid elevations; or to the follicles and glandulæ agminatæ, assuming the appearance of warts, or patchy excrescences.

Ulceration. This lesion, in a vast majority of instances, is a sign of previous inflammatory action (most frequently of the chronic kind), and occurs in a great variety of forms. It may be confined to the villi or to the follicles simple or agminated; or it may reach the muscular coat, and even penetrate the peritoneum. The characters of ulceration in different parts of the tube will be described hereafter; we now content ourselves with remarking that, in the stomach, it is very rarely the result of acute inflammation, but, in the intestines, such a consequence is by no means infrequent.

Effusion. An increase of mucous secretion confirms the evidence of inflammation afforded by vascularity. The opposite state of dryness is a scarcely less valuable sign, indicating an earlier period of inflammation. Blood mingled with the mucus affords, if possible, still stronger proof. But hæmorrhage alone, whether on the surface or into the tissue (such as produces maculated and striated ecchymosis) may betoken inflammation or simply local plethora; though it may likewise result from mere mechanical congestion, or from a morbid fluidity of the blood. Fibrinous matter is not often detected upon the free mucous surface; it is, perhaps, not unfrequently overlooked from being confounded with shreds of mucus. When secreted in the mucous or submucous tissue, it causes thickening and induration. It is almost superfluous to add, that the evidence afforded by pus is unequivocal. This secretion is generally found on the surface of ulcers, but it may also occur where there is no marked abrasion of the villous coat.

The symptoms of Gastritis vary according as the disease is acute, subacute, or chronic.

1. *Symptoms of acute gastritis.* This disease being almost exclusively the result of direct irritation from substances taken into the stomach, has no *precursory symptoms* of which we could speak with any degree of precision. One of the earliest symptoms is intense pain in the epigastrium, with a peculiar feeling of distress, extending under the sternum, and often to both hypochondria. It is frequently accompanied by a sense of burning, which may also be felt along the œsophagus. The slightest pressure aggravates the suffering; and the same effect is produced by inspiration, swallowing, or vomiting. The latter affection is to the last degree distressing, and alternates with the most deadly nausea and retching. The matters vomited, at first chymous or bilious, afterwards consist of little more than mucus stained with sanguinolent or sanious matter. An unquenchable thirst, with longing for cool drinks, which the stomach is seldom willing to retain for a minute, adds to the tortures of the patient. The local signs are a fulness of the epigastrium, and a great increase of heat perceptible to the hand.

The extreme prostration of which the patient complains is denoted by the sunken altered countenance, the paleness, and the cold clammy extremities in the advanced stage, and in some very rapid cases almost from the beginning. In others the face, though expressing great anguish, is, in the earlier hours, flushed, and the skin hot, dry, and harsh. The pulse is frequent, and small, for a short time resistent, but soon becoming weak and thready. If the irritation is confined to the stomach, the bowels are constipated. The urine is scanty and high coloured. The tongue is for the most part redder than natural, and covered in the middle with a thick flaky fur.

These and other symptoms vary with the nature of the exciting cause; and for an account of such varieties, we must refer to treatises on poisoning.

The disease most likely to be confounded with acute gastritis is peritonitis, which resembles the other in the intense pain, the vomiting, and the symptoms of prostration; but the diagnosis may be indicated by the situation of the pain, which, in peritonitis, is diffused over the lower parts of the abdomen, instead

of taking a direction towards the thorax, by the peculiar thirst, the sense of burning in the epigastrium, the aspect of the tongue, and the mucous nature of the matters vomited.

The disease, if it does not terminate in death in a few hours, or by the second or third day, may extend to two or three weeks, and still prove mortal; or it may pass into chronic gastritis of indefinite duration. Death in the rapid cases is produced by depression of the vital functions, particularly the circulation, apparently from the close sympathy between the heart and the diseased viscus.

2. *Symptoms of subacute gastritis.* This is far more common than the acute variety, being a frequent accompaniment of disease in other organs, and not less often supervening upon the chronic form. The symptoms are pain or uneasiness in the epigastrium, with tenderness on pressure, anorexia, nausea, sometimes vomiting, a sense of distention, flatulence, eructations, thirst, and dryness of the mouth. The tongue is generally red at the tip and margin, and sometimes over the whole surface, with elevated papillæ. The pain in the stomach is excited or aggravated by solid food, and stimulating or warm liquids. Many anomalies, however, occur in this respect. We have known persons able to take portions of brandy and water without uneasiness, while warm tea or coffee would immediately bring on the pain. The bowels are sluggish, the skin is dry, and the urine high coloured. The sympathetic disorders are feverishness, headach, particularly over the forehead, cough of a hard paroxysmal character, and pains in the limbs. Sometimes these morbid sympathies are so intense, as to supersede or to withdraw attention from the local symptoms. When the gastritis supervenes on disease in other organs, instead of acting revulsively, it more frequently aggravates them; it is one of the most serious additions to the sufferings of the phthisical patient. The countenance has nearly always a distressed irritated expression, the cheeks are suffused with a circumscribed redness, the lips look dry and parched, the eyes suffused, the lids turgid, and the tarsi sore.

Nothing can be more variable than the duration of this form of gastritis. If ascertained at an early period, it may soon give way to the appropriate remedies. But very commonly it escapes attention until it has become chronic, and then it is far less easily coped with. As the disease is so commonly masked by the remote affections which it calls into existence, it is not surprising that the diagnosis is often difficult.

3. *Symptoms of chronic gastritis.* The local symptoms differ little in degree from the form just treated of; but they are more variable, and are complicated with a greater variety of sympathetic affections. Sometimes they are very marked; thus, the pain may be severe and uniformly brought on by ingesta, and the tenderness constant. The vomiting is often accompanied by the discharge of a colourless glairy fluid, or of mucus in large quantity. Sometimes instead of pain, there is a gnawing or raking sensation in the stomach, a feeling of fulness, or of something hard or heavy pressing upon the epigastrium. The gnawing sensation in some persons, suggests the idea of a living animal enclosed in the stomach. A feeling of vacuity or sinking, is often a source of great distress to the patient, and though it prompts him to take food or a cordial, he is little relieved by it. The appetite is irregular; now there is an utter disgust for food, and now a morbid craving; the articles selected being of the most inappropriate description. The taste is often vitiated, so that every thing has lost its proper, or acquired a new flavour. After food has been swallowed, a feeling of bitterness is sometimes left, with watering of the mouth; sometimes acidity. Bread, biscuit, tea, even water will leave this impression on the palate. Instead of acidity, the patient sometimes complains of a sensation in the stomach cognate to it, which is called heart-burn. Flatulence, and eructations of fœtid gas, or acrid secretions, sometimes take the place of, or are added to the other symptoms. Palpitation, pulsation of the epigastrium, pain between the scapulæ or in the hypochondria, are among the

most common sympathies of contiguity. The action of the intestines is generally torpid, and the appearance of the stools often indicates that the liver is disordered, but by no means constantly. The urine is either of a dark brandy colour and clear, or of a lighter hue, but turbid, — often it is covered with an iridescent film, — occasionally it is passed with difficulty. The skin is for the most part harsh and branny, and frequently affected with papular and squamous diseases. The tongue may appear healthy, but more commonly its hue is one of a deep red. The fur is often in patches, giving it a variegated aspect; even when the two anterior thirds of the organ are clean, the posterior may be thickly coated. Sometimes instead of a decided crust, there is a viscid glutinous mucus clinging to it. Its surface is commonly either preternaturally smooth and shining, or presents fissures of the epithelium. The gums look spongy and unhealthy. The follicles at the base of the tongue are swollen, and the whole surface of the posterior fauces is more injected than natural. The lips are sometimes chapped, and a similar condition may be noticed at the margin of the nares.

Feverishness alternating with chilliness, is often complained of, especially at night. The pulse has nothing characteristic; in some persons it is steadily slow, in others, frequent and irritable; in this patient intermittent, in that, irregular. The morbid sympathies are endless. Those of the duodenum, and the biliary apparatus might be well expected, but they are often less marked than in organs more remote. Perhaps no system is more frequently and deeply involved than the nervous. Headache, confusion of thought, inaptitude for mental exertion, sleeplessness or distressing dreams, dimness of sight, muscæ volitantes, pain in the eye-balls, preternatural acuteness or dulness of hearing, noises in the head, pains in the back, the sides, the limbs, sometimes amounting to neuralgia, numbness, impairment of muscular power, locally or generally, unwonted sensations in parts of which we are generally unconscious, alterations of the natural feelings, tremors, spasms: irritability of temper, morbid gloom, entire occupation of the mind with bodily feelings, hallucinations; these are but a scantling of the myriad disorders of thought, sensation, and motion to which the patients alluded to become a prey. The thoracic organs are likewise affected; presenting bronchial irritation, dyspnœa, asthma, and a cough well known as gastric, and distinguished by its hard sounding spasmodic character, with the absence of sufficient disease in the chest to account for it We have already spoken of palpitation and irregularity of the pulse; the former is sometimes accompanied with pain under the sternum, and in the inside of the arm, imitating *angina pectoris.* In the genito-urinary system we meet with dysuria, spasm of the urethra, nephralgia; in the male, shooting pains in the testicles, psoriasis of the glans penis; in the female, menstrual irregularities, leucorrhœa, prurigo pudendalis, &c.

We have seen that the secretions are altered and diminished. Textural nutrition for a time may appear little affected; but when the disease has existed long, this effect becomes manifest enough in the general emaciation, and in the unhealthy complexion. There is evidence, moreover, that it is changed in kind as well as in degree, from the organic diseases which are apt to supervene. A sufficient cause for this might at first appear to be found in the faulty elaboration of chyle and consequently of blood; but there are probably direct morbid sympathies between the diseased stomach and the nutrient actions. This would seem indicated by the unhealthy aspect which ulcers and wounds are apt to assume, and, upon analogy, by the depraved secretions.

The symptoms which we have enumerated constitute a form of *dyspepsia*, or inflammatory indigestion. Some authors consider dyspepsia as always dependent upon an inflammatory or a congested state of the mucous membrane of the stomach. This, however, we consider to be a narrow view of the subject, and long observation has led us to believe in the existence of a purely functional disorder of the stomach, that is, uncomplicated with any structural alteration, or with appreciable permanent disease of the capillary circulation. Of almost every

other organ the same remark obtains, certainly of the brain, the lungs, the liver, and the kidneys. But while we maintain that the collective symptoms resulting from chronic gastritis constitute only one form of dyspepsia, we concede the difficulty in a great many instances of pronouncing a similar set of symptoms to be independent on such a state of the mucous membrane, and also that great errors in practice are committed every day by overlooking this frequent cause of a disorder, which by many is treated as if it were always functional. Let us endeavour to point out one or two features more especially characteristic of the cases in which an inflammatory condition prevails. Pain, spontaneous, or occurring after food, may depend on mere increase of sensibility. It is often concluded that the pain is not inflammatory if relieved by stimulants and carminatives; but this is not decisive, for reasons which will appear when we discuss the treatment, though in the majority of cases of gastritis, the pain would be aggravated by such means. We have found a better test in the effect produced by hot liquids, such as tea, or plain water, which seldom fail to aggravate or induce pain in these cases. The existence of tenderness at the epigastrium, will confirm this evidence, but cannot be alone relied upon. The state of the tongue used to be thought one of the strongest diagnostic signs, but it is liable to great fallacies. Andral (*Clin. Méd.*, t. iv.) and Louis (*Gastro. Ent.*, t. ii. p. 64., have proved that gastritis may co-exist with a moist clean tongue of natural colour; and, on the other hand, that this organ may be red, papillated, or even aphthous, with a healthy state of the stomach. Still in a large proportion of cases, such alterations of the natural appearance of the tongue as we have enumerated among the symptoms, are observable, and should at all events lead us to suspect the disease. The state of the skin is an important help to us; thus squamous and papular disease, co-existing with stomach disorder, intimates very strongly that the mucous membrane is inflamed. The relief afforded by antiphlogistic means, affords some useful hints; but it must be valued only in connection with other signs. We may remark, however, that relief ensuing upon iced drinks, is more decisive than when produced by local depletion, for the latter will sometimes mitigate a purely nervous gastralgia. The nature of the matters vomited is a valuable indication. For example, it is improbable that a large quantity of mucus should be secreted, unless the membrane had been previously in a state of plethora.

Death from chronic gastritis may be caused by the general exhaustion, consequent both upon the long-continued irritation of so important an organ, and upon the impairment of the nutritive function. In most cases, however, the fatal event is brought about by some of the complications of the disease; more particularly those occurring in the liver, the kidneys, and the lungs.

Anatomical characters of gastritis. We have now only to point out those modifications of the appearances already described, which are peculiar to the stomach. When this organ has been violently inflamed, it is generally found contracted, and the mucous membrane so wrinkled as to present the honeycomb appearance. In different parts, the form of the red injection varies. In the fundus the redness is more uniform, the villous coat has a swollen appearance, and the larger trunks of the vessels are more loaded; while on the anterior and superior surface, we meet with the finer distributions of redness, the capilliform, the punctiform, and the stellated; the intervening membrane, however, being of a more rosy hue than natural. The colour also in the latter situations is more vivid. On the borders of the elevated rugæ it is not uncommon to perceive spots and stripes of ecchymosis; these we have noticed in animals poisoned by arsenic, and in parts of the stomach where gravitation could not have favoured the congestion. In some cases the blood is extravasated in the submucous tissue, presenting the appearance of black warty excrescences, particularly insisted upon by Dr. Christison as indications of poisoning by certain irritants. In less intense degrees of inflammation the redness and vascularity are more circumscribed, and the surface of the stomach is less puckered.

Chronic gastritis may be easily recognised by the hypertrophy of the mucous

tissue, and by the brown, slate-grey, and chocolate tints. The last-mentioned, however, must not be confounded with the violet colour of congestion from venous obstruction, —an appearance very common in persons who die of disease of the heart. We must also take care to distinguish the effects of the gastric juice on the blood in the veins, from true pathological appearances. In the former case we find in the fundus of the stomach, just where the gastric fluid gravitates, dark sooty lines, which are easily recognised to be veins, while the interjacent membrane has a dull pearly aspect, sprinkled with points of the same sooty hue, and often a pulpy consistence. Dr. Carswell's researches have established beyond all doubt that these appearances are caused by the chemical action of the gastric acid, and that they may be produced after death. It is true that the brown tint of chronic inflammation may depend on an alteration of the colouring matter of the blood from the same cause; but in this case the matter is incorporated with the tissue from an action evidently of long standing: the appearance is not confined to the fundus of the stomach, nor is the part traversed by the large trunks of veins above described; and the membrane instead of being softened may be firmer than natural. Lastly it must be remembered that the appearances of a *post mortem* action of the digestive acid, and those of chronic inflammations, are frequently combined. And indeed the quantity of blood accumulated in the membrane by the inflammatory process will favour the former appearance by supplying materials for its production. Such a combination will be detected by observing the state of the membrane adjoining the fundus.

Both in acute and in chronic gastritis the follicles are generally more developed than usual. In the former, as we have observed, they not unfrequently present the appearance of red spots, or of small red circles. In the latter they are sometimes so much enlarged and elevated, as to produce what has been called the mammellated appearance. In other cases this would seem to depend on hypertrophy of the villi. Ulceration is nearly always the effect of chronic gastritis, excepting in cases of irritant poisons.

Causes of acute gastritis. A person in health is perhaps more secure from an invasion of this disorder than of any other acute malady; that is, the more common causes of disease, such as cold, damp, fatigue, &c. rarely if ever induce it. When the disease can be at all referred to such agency, we shall find that the patient had been previously labouring under the chronic form. Its causes, then, may be said to be such as act, not through the general system, but by a direct operation on the stomach itself. The most prominent of these are the poisons called *irritants;* comprehending substances which act chemically upon the tissue, as the concentrated mineral acids and alkalies, oxalic acid, and corrosive sublimate; those which excite inflammation without producing any chemical action, as arsenic, salts of copper, and acrid vegetables; mechanical irritants swallowed, such as pieces of glass and metal; mechanical injuries, such as blows, wounds, &c. Some articles of food, or substances not at all capable of irritating a healthy stomach, or under ordinary circumstances, may be decided irritants: a draught of cold water, for instance, during exhaustion from violent exercise. We have known very severe gastritis induced by cyder, or subacid beer, in persons previously liable to disorder of the stomach. Fruits and crude vegetables may have a similar effect.

Causes of subacute gastritis. This common accompaniment of other diseases may be generally traced to errors of diet, to exposure to cold and damp, to fatigue, mental excitement; these causes being rendered operative by the previous or concurrent indisposition; as in convalescence from fevers, in phthisis, rheumatism, and gout. In the two last-mentioned diseases it is apt to alternate with inflammation in other organs. The most common predisposition, then, is produced by other diseases. Of the different ages, we have no doubt that infancy is the most liable, for the obvious reason that the mucous membrane is not fitted for the variety of aliments which are often applied to it, and of which it becomes tolerant, only when the teeth have emerged.

Causes of chronic gastritis. This disease, as we have already observed, is often the consequence of the subacute variety, and depends on the same kind of causes. Alcoholic drinks, indigestible articles of food, excess as to the quantity, and too great frequency in the times of eating, are the most common exciting agents. A dry sea air has been often known to induce the disease, most probably through its action upon the skin. Persons engaged in occupations which oblige them to maintain a stooping posture for several hours in the day, such as shoemakers, tailors, clerks, &c. are very liable to disorders of the stomach, dependent on chronic congestion or inflammation. The mere sedentariness of the employment would in some measure account for the predisposition which it occasions; but we must not lose sight of the impediment to the venous circulation produced by the want of free action of the diaphragm. The venous obstruction, caused by valvular lesions of the heart, and chronic diseases of the lungs, induces a similar tendency.

Treatment of acute gastritis. If poison has been taken, the first object is to remove or to neutralise it; but we must refer to works on toxicology for the specific treatment required by different kinds of irritants. The severity and rapid progress of this disease would appear to call for the boldest application of antiphlogistic measures: but before resorting to them we must bear in mind two important circumstances: 1st. that many of the causes of the malady have a specific depressing influence on the heart and the nervous system; and 2dly, that when acute has supervened upon chronic gastritis, the system is too much debilitated by the previous malady to bear the same activity of treatment as would be appropriate to a purely recent disease. The cases then are rare in which we shall find it needful to push general bleeding far. One venesection however is generally practicable, provided the skin is not cold and moist, the pulse thready, or the countenance collapsed. If there is general heat, with a flushed face and a tolerably firm pulse, we may abstract blood from the arm not only with safety but with advantage. But our main reliance must be placed on leeches, applied in numbers proportioned to the age of the patient. We are of opinion that more good is derived from frequent relays than from a large number applied at once; even though the quantity of blood abstracted is the same. Patients generally experience great relief to the pain of internal inflammation at the very time the leeches are drawing, which may be attributed partly to the counter-irritation, and partly to the circumstance that the blood is more forcibly attracted to the surface during their suction. We cannot otherwise account for the benefit produced by a very small number of leeches, in some diseases, the quantity of blood lost being far too inconsiderable to explain the effect. Inflammation of the mucous membrane may in many respects be managed on the same principle as inflammation of the skin; and as we use soothing applications in the one case, so may we in the other. We therefore are in the habit of ordering anodynes in all forms of mucous inflammation to which we can insure their direct application, as for instance to the stomach and the large intestine. In gastritis we may exhibit morphia, hydrocyanic acid, and hyoscyamus, with excellent effect, but it must be remembered that they are only auxiliaries. We sometimes prescribe them in combination with magnesia or soda. They are demanded however not only as a part of the antiphlogistic treatment, and therefore with a view to remove the disease itself, but also to soothe the pain and the vomiting. French practitioners are much attached to the use of acidulous mucilaginous drinks. If they are grateful to the patient there is no objection to them, and they may perhaps be useful as emollient applications; but for the latter effect, they must be used in greater quantity than is for the most part desirable. In the earlier periods of inflammatory disease, the stomach is contracted throughout as well as disposed to irregular spasmodic action, and therefore the copious ingestion of fluids leads to distention, and an increase of the pain and nausea. Few things are at once more agreeable and salutary than iced drinks. A piece of ice may be held

in the mouth so as to dissolve gradually. When food can be allowed, cold arrow-root or sago-jelly, pleasantly flavoured, are unobjectionable articles.

The exhibition of remedies by the stomach is to be avoided as much as possible. Certainly we must not think of acting upon the bowels by purgatives so administered. This purpose must be accomplished by means of enemata, consisting of thin gruel, to which infusion of senna or castor-oil may be added. Sometimes the carbonate of magnesia, as we have already observed, with the addition of a little hydrocyanic acid, may be tolerated by the stomach, and be sufficiently laxative; and in some cases instead of constipation we have the opposite state to contend with; but this is when the inflammation has extended to the lower part of the ileum and to the large intestine.

The exhibition of mercury, so important in all acute inflammations, is difficult in the present disease. If we determine upon its employment, it must be in the way of inunction or fumigation, but in the acute stage we have but little time for such processes. When leeching has been carried as far as seems desirable, we may use cataplasms, fomentations, or in some cases even cold applications. In the choice of hot or cold applications we may generally be guided by the patient's feelings.

These are the chief circumstances to be attended to in the treatment of acute gastritis. If the patient survives, he has often to go through the chronic form, the management of which we shall speak of presently.

2. *Subacute gastritis* must be treated on the same general principles as the acute. In some cases a general bleeding is a good preliminary to local depletion, but the latter is for the most part sufficient. It may be followed by sinapisms or blisters. The food should consist of bland farinaceous substances. We may venture upon mild laxatives by the mouth, such as manna, magnesia, castor oil, infusion of senna, and alterative doses of hydrargyrum cum cretâ.

3. In *chronic gastritis* local depletion is scarcely less important than in the preceding varieties, but it requires some difference in its employment. As we generally have to look forward to a tardy improvement, the cases being rare in which the disease can be removed by a *coup de main*, leeches are to be applied, in smaller numbers, and more frequently, though at more protracted intervals. Their effect may often be greatly aided by a preliminary general bleeding; but this will not be advisable if the disease has been of sufficiently long continuance to lower the strength and the nutrition of the body. If, on the other hand, the patient is still in tolerable vigour, and not deficient in his general circulation, the happiest results may be expected from venesection followed by local bleeding. We are persuaded that one of the most frequent mistakes in practice, is to apply leeches in too large a number, in cases of gastritis; the consequence of which treatment is to exhaust the strength of the patient by the quantity of blood lost, before there has been time for reducing the morbid action in the stomach, by the revulsive agency of the remedy, as well as to prevent its repetition. We believe it is seldom necessary to apply more than six at a time, and sometimes three or four suffice. They may be applied daily for three or four days, or even a week, according to the strength and the degree of pain; and afterwards twice or thrice in a week. During this time the diet must be of the most unirritating kind, consisting of farinaceous food and milk and well-boiled gruel: and the interval must be sufficient to give repose to the stomach. A lemon-water ice may be allowed after the principal meal. Improvement will be indicated not only by a diminution of spontaneous pain, vomiting, flatulence, &c. but also by the greater comfort after a meal, by the absence of feverishness, the improved sleep, and the alteration of the tongue. The change is often most striking and exhilarating to the patient, who had previously been trying in rapid succession, and with ever-recurring disappointment, the various nostrums commonly recommended in cases of indigestion. He must, however, be warned not to mistake this first stage for the whole of the cure, or to fancy that he may return at once to his usual habits. The local depletion should be followed by counter-irritation, and no form of this has answered better in our hands than a succession

of small blisters to the epigastrium, about the size of a crown piece. When they produce much general irritation, we may substitute friction with croton oil; occasionally we shall find the epigastrium very insensible to such agents. When this is the case, we may resort to tartar emetic, combined with lard as an ointment, or with Burgundy pitch as a plaster. The latter is a very effective though severe remedy. We have known relief ensue in the most obstinate cases during the eruption of the pustules.

The medicines employed in this disease are for the most part of a palliative description, such as anodynes and antacids. But of the first of these we may remark that their effect is not only beneficial by soothing the pain, but also by changing that condition of the nerves, which is so much connected with the excitement and maintenance of inflammatory action. Morphia and prussic acid are the most efficacious of this class.

In many cases anodyne applications to the epigastrium afford comfort in the form of fomentations, plasters, liniments. We often make use of a belladonna liniment, and of morphia sprinkled on a blistered surface.

A carefully conducted course of mercury may be resorted to in some cases, not only for the sake of keeping up the function of the liver, which often fails in this disease, but also for its specific effect in altering capillary action. Small doses of Pil. Hydr. or Hydr. c. Cretâ combined with a sedative, may be administered every night till the gums are tender.

The regulation of the bowels in this disease is a matter of great nicety. The medicines most called for are generally such as the stomach is least capable of receiving. We might suppose that enemata would answer the purpose; but unfortunately, though they succeed in unloading the lower part of the canal, they are incapable of promoting the secretions of the upper part, without which there can be no sufficient peristaltic action. It may therefore be almost imperative to give laxatives by the mouth. The most eligible are castor oil, Rochelle salts, manna, sulphur, infusion of senna, and lenitive electuary.

Aromatic medicines seem objectionable when the mucous membrane is inflamed, but our *à priori* expectations are often disappointed by the peculiar sensibilities of the stomach; and so far, in some cases, are substances, apparently pungent and acrid, from irritating the stomach, that they even soothe it. This remark brings us to speak of a class of remedies in chronic gastritis, entirely different from those to which we have hitherto adverted.

Every practical man has met with cases which seemed to require the depletory unstimulating treatment described above, but in which only the most transient relief was derived from it, or in which it absolutely increased the distress. In cases of this kind (which will be found to be of long duration) such medicines as Arg. Nitr., Bism. Trisnitr., Ol. Terebinth., T. Benz.Co., Creasote, Ferr. Sulph., Quin. Sulph., and bitter infusions, have been used with advantage. Nor ought we to be surprised at their effect, when we know what a variety of stimulating agents are used beneficially, in the treatment of chronic inflammation of the skin and the mucous membranes of the mouth, throat, conjunctiva, rectum, vagina, urethra, and bladder.

Of many of the above mentioned remedies it is probable that the operation is chiefly local; that, applied directly to the diseased membrane, they change the action, which appears to be particularly the case with nitrate of silver. The management of them, however, requires great care and watchfulness, and they often need variation. In many cases the nerves of the membrane are far too irritable to bear any but the most soothing agents; and in others their sensibility seems to have been obtunded by the disease. Sometimes after going the round of these substances, we return with advantage to the simple treatment; just as we have seen an obstinate ulcer, or a psoriasis, which after the failure of a host of stimulating unguents has healed under the use of plain water dressings. We must offer a caution against imagining that because the stimulating treatment seems to produce relief in stomach cases of long standing, that therefore they are merely examples of atonic dyspepsy.

The pathological conditions to which this treatment is adapted are of two kinds. In the first, the mucous membrane has undergone considerable textural alteration; we have generally observed it in such cases hypertrophied, mammellated, and of a slate hue. The second kind is one in which there is less organic change, but the inflammation and congestion are passive. (See PATHOL. INTRODUCTION.) In many instances it is in vain that we attempt to diagnosticate the precise condition of the capillary circulation, whether it be one of mere engorgement or of absolute stagnation of the blood, since they always co-exist, and readily pass into each other; that is, congestion becomes inflammation, and inflammation leaves congestion behind it, and a spot of inflammation is always surrounded by a halo of congestion. Happily the same treatment is applicable to both, though in somewhat different degrees.

Warm bathing is beneficial in nearly all cases; a mild climate should if possible be obtained, and the patient must be admonished to take regular gentle exercise. The mineral waters of Harrowgate in this country, and of Ems and Marienbad on the continent should be tried in obstinate cases.

ORGANIC DISEASES OF THE STOMACH.

1. *Carcinoma. — Anatomical characters. — Symptoms. — Causes. — Treatment.* 2. *Softening — Inflammatory — Chemical action of the gastric juice.— Gelatiniform softening.* 3. *Ulceration — Varieties. — Symptoms. — Treatment.* 4. *Perforation. —Morbid.—Cadaveric.*

CARCINOMA OF THE STOMACH.

Anatomical characters. Having already treated at large of carcinoma (in the PATHOLOGICAL INTRODUCTION), we confine ourselves now to its appearance in the stomach. The most common form under which this disease presents itself is *scirrhus*, or the indurated, fibrous, semi-cartilaginous formation; and the part which it most frequently attacks is the pylorus. On making a section of the disease, the stomach is found thickened, of a grey or ashy colour, and streaked by lines, in which may be traced the muscular fibres hypertrophied, and in some cases apparently converted into carcinomatous matter; but the sub-mucous cellular tissue is still more altered and indurated. The thickness is sometimes very considerable; we have found it more than an inch and a half, but it varies according to the diffusion of the deposit. When concentrated in one spot, the thickened part assumes the appearance of a lardaceous tumour growing in the walls; but the present form of the disease is characterised more by hardness than by bulk. The mucous membrane is either thickened and indurated, or partially ulcerated, with irregular elevations of the margin. The ulceration often perforates the stomach, and penetrates into adjacent viscera. When the whole organ is more or less affected, its volume is greatly diminished, though its parietes are thickened, and in this state it has reminded us of concentric hypertrophy of the heart.

In another form we find the cephalomatous characters prevail. The morbid deposit is collected into masses somewhat globular, growing from the submucous tissue, and throwing the mucous membrane forward, into the forms of polypi, fungi, vegetations, &c. Some of these consist of the true villous coat hypertrophied; others of medullary matter. In some parts of the organ we find a plentiful distribution of vessels, constituting the fungoid disease, or fungus hæmatodes. The density diminishes from the serous towards the mucous surface, the thickness often extending to several inches. This form prevails in the cardia.

A third form is that in which the parietes are considerably thickened, and in which a section of the morbid part presents no traces of the proper tissue of the stomach, but instead of it a great number of little cells, intersected by fibrous septa, and containing a glue-like matter; whence the disease has been called gum-cancer, or gelatiniform cancer, or from the cellular appearance, *cancer aréolaire*. M. Cruveilhier has given a particular description of it in his *Anat. Path.*, liv. x. Of all the forms it is that which is least frequently attended with indications of cancerous cachexia. The seat of this form of carcinoma is the pyloric extremity.

It is not often that we meet with the two first of these forms unmixed. More frequently they run into each other; the dense fibrous tissue being found in one part, as at the exterior of the tumour, and the soft medullary matter on the inner surface. Neighbouring organs are not unfrequently involved, particularly the liver and the omentum. We have remarked that the volume of the stomach is in some cases much lessened. When, however, the disease is confined to the pylorus, and produces obstruction of its aperture, the rest of the organ is often enormously dilated, with hypertrophy of the muscular coat.

The principal *symptoms* are the following: pain in the epigastrium, often of a burning character, more rarely lancinating, and occasionally of a gnawing description; eructations, acid or bitter; nausea; vomiting, at first of ingesta and mucus, afterwards of a ropy or shreddy white substance, and, at a still later period, of bloody or sanious matter*; constipation, succeeded in the advanced stages by diarrhœa and extreme emaciation. To these symptoms may be added the following *signs*: a fulness in the epigastrium perceptible to sight and touch in the early periods, afterwards a hardness more or less circumscribed; and the peculiar hue and expression of the countenance belonging to the cancerous cachexia.

Although the above list comprises the usual phenomena of the disease, not one of them is pathognomonic, and any one of them may be absent. Our judgment must depend upon their concurrence. We shall offer one or two remarks upon the variations of the more prominent symptoms. The *pain* is sometimes increased by pressure or by aliment; more rarely unaffected; sometimes there is none. This is more frequently the case in the medullary sarcoma. Cruveilhier thinks that the gum-cancer is oftener latent than any other form. We discovered an enormous tumour in the cardia of a woman, chiefly encephaloidal, the vegetations of which projected into the cardiac orifice; but she had complained, during the latter days at least, neither of pain nor vomiting; nor could we learn that she had previously suffered from either of these symptoms: ascites, weakness, and emaciation were the only signs. *Vomiting*, then, is not a constant occurrence, but it may be present at one period of the disease, and afterwards disappear. This has been observed even in cases in which the symptom is most frequent, that is, in scirrhus of the pylorus. The obstruction is sometimes so mechanical, that vomiting continues throughout the disease, but there are two reasons why it may subside; 1. the obstruction may be removed by ulceration; 2. the muscular actions of vomiting respond best to irritations of the mucous membrane; and, consequently, when this is destroyed or disorganised, the usual medium of sympathy is cut off. The *matters ejected* are by no means unequivocal, since they are met with in the ulcerations of chronic gastritis. The *tumour* is one of the most certain indications when accompanying the gastric symptoms, but is often wanting; and we must not forget that it may be caused by the liver, the spleen, or the pancreas.

The disease most likely to be confounded with carcinoma of the stomach, is chronic gastritis with ulceration. The local and general symptoms may be precisely the same, but the presence of a tumour in the epigastrium will throw

* The coffee-ground appearance which occurs in this and other chronic diseases of the stomach, as well as the black vomit of yellow fever, consists of blood darkened and otherwise altered by the digestive fluid.

the evidence in favour of carcinoma. The age of the patient must be taken into account; for carcinoma ventriculi rarely happens before the age of forty. The pale lemon tint of the countenance, and the emaciation appearing very early in the disease, together with general languor and depression, are additional characteristics. But it has been confessed by the most acute and experienced observers, that the diagnosis is often one of the utmost difficulty, and Andral has declared, "hors le cas où une tumeur se fait sentir à travers les parois abdominales, il n'existe aucun signe certain pour distinguer ce qu'on appelle, dans le language médical ordinaire, un cancer d'estomac, de ce qu'on appelle une gastrite chronique." (*Clin. Méd.*, 1re édit. t. iv. p. 432.)

The disease is conjectured to exist in the cardia when the pain and vomiting occur immediately after food, and especially if there is a feeling of impediment at the end of deglutition. The pylorus may be the inferred seat, when the pain and vomiting are later in their accession after food, and when a tumour is distinctly perceptible. In some cases the tumour has been observed to rise during the process of digestion, in accordance with the change in the configuration of the stomach.

The progress of carcinoma, especially of the scirrhous species, is generally very slow. In some cases there are intervals of amendment in the local symptoms not easily accounted for, but by supposing that the congestion and inflammation which accompany this, as well as other kinds of heterologous disease, are susceptible of abatement, or temporary suppression. Moreover if the disease is sometimes latent during its whole course, we cannot wonder that its manifestations should be in any case suspended. On the exterior of the body, as in the mammæ, we observe it remaining inert a long time, even after ulceration has commenced; but this is much less likely to happen in the stomach, because of the slight amount of repose allowed to its function.

Causes. Carcinoma in the stomach, as elsewhere, pre-supposes a peculiar diathesis. (See PATH. INTRODUCTION.) Men are more liable to it than women; perhaps from their being more frequently exposed to the exciting causes, particularly irregularities of diet and the abuse of alcoholic drinks. Whatever produces congestion in the stomach may, in a person of the cancerous cachexy, determine the disease. Depressing emotions have been long recognised as causes; and, believing that these are more frequent and obstinate in men, M. Dalmas alleges that this is a sufficient reason why the latter should be more liable than females to scirrhus of the stomach. But these emotions lead to the formation of carcinoma in other organs, and such as are more frequently affected in women. It must be allowed, however, that no function is more disordered by mental states than that of the stomach. Certain occupations obliging the body to be bent forwards, as those of shoe-makers, tailors, curriers, and others, have been considered productive of the disease; but they exert no influence more specifically injurious than that of deranging the stomach.

Treatment. Though there is no cure for carcinoma, we may do much towards alleviating the dreadful sufferings of the patient, and even retarding the progress of the malady. The selection of proper articles of diet is of the first importance; but there are few general rules which can be laid down on this subject, as the peculiarities of individuals are so widely different. There is no question, however, that the food which contains most nutriment, and is at the same time least stimulating, is the best. A milk diet is of all others the most suitable when it agrees; but some persons are unable to digest this fluid in any form. Some are most comfortable when living entirely upon farinaceous substances and animal broths; but in others, and not a small proportion, tender meat with boiled rice answers best. The cases are very few in which wine is beneficial or even agreeable, but when much acidity and flatulence prevail, a small quantity of brandy and water may be taken. Sometimes our wonder is excited at a *post mortem* examination, by observing the disorganisation of a stomach into which substances, apparently the most inappropriate, had been taken with impunity and even with relish. This obtains both in chronic gas-

tritis and in the disease under consideration. There is no end to the anomalies presented by gastric sensibility, but the probable explanation of the benefit produced by some kinds of stimulant substances has been already adverted to. In a very large majority, however, of cases of cancerous disease, we are persuaded that a system of quietude and non-interference is best. Leeches, in small numbers, may be applied occasionally to the epigastrium, to moderate the congestion and inflammation which accompany the disease. As to medicinal treatment, we have very little to say beyond the recommendation of anodynes for relief of the pain and sickness. These substances have appeared to us more efficient in combination than when administered singly; and it is a good plan to vary them frequently, in order that the system may not become insensible to them by long-continued use; for it has been often observed, that after employing a strong sedative for some time, a change even to a weaker one will produce more effect. Morphia and prussic acid act well together; opium, hyoscyamus, and conium; belladonna, stramonium, and extract of poppy. As to morphia, it is a fact not easily explained, that in some persons sickness more frequently results from its use than from opium itself. Perhaps some of the other principles in the opium counteract this effect. Anodyne applications to the epigastrium are valuable auxiliaries; such are belladonna ointment, linen steeped in a watery solution of belladonna or in hot laudanum, cataplasms of oatmeal or bread impregnated with laudanum, or made with the leaves of hemlock or belladonna, morphia sprinkled on a small blister, &c. Particular symptoms may require special treatment; such as acidity, bitterness, and flatulence. The action of the bowels must be secured by means similar to those recommended under chronic gastritis.

SOFTENING OF THE STOMACH.

It has been already stated that softening of the villous coat, and of the submucous tissue may result from inflammation. We only advert to it again for the purpose of warning the practitioner against mistaking for inflammatory what may be only chemical softening, of a kind to be described presently. Some of the most able modern pathologists have erred upon this point. M. Louis, for instance, attributed, at one time, some instances of pale softening and thinning of the mucous membrane at the cardiac extremity of the stomach, to a slow inflammatory action, but which have been satisfactorily shown to be cadaveric. That this is the more correct explanation is (much to his honour) admitted by M. Louis himself in one of his most recent publications. (*Examen de l'Examen de M. Broussais*, p. 16.).

That the gastric juice has the power of softening and dissolving the coats of the stomach after death, so as to produce perforation, was first shown by John Hunter. His observations were confirmed by Spallanzani, Adams, Burns, and Jæger; and still more recently by Dr. Carswell, whose experiments, conducted under a great variety of modifications, have placed the matter beyond all doubt. The fundus of the stomach is the part most frequently acted upon, because it is most depending. The following extract will convey an excellent idea of the lesion: "The form of chemical softening of the coats of the stomach by the gastric acid presents several important varieties. If the softening be confined to the mucous membrane of the fundus, the form which it assumes is that of small or large patches. These are generally irregular,—their bodies being formed by the mucous membrane, and the bottoms of each by the submucous coat; their edges, besides being irregular, are thin, soft, and somewhat transparent. If the softening has extended to the other coats of the stomach, the edges of these are bevilled outwards, present a fringed appearance, or terminate in thin irregular prolongations which, when water is poured upon them, are seen to float like shreds of transparent coagulable lymph. Such are the forms of softening of the mucous membrane, so long as this membrane is smooth or stretched out by the contents of the stomach. But when this membrane is

thrown into folds, or forms plicæ, the softening occurs no longer in patches, but presents those remarkable appearances described by M. Louis, as indicating the existence of pathological alterations. The forms of the softening, in this case, are those of stripes and bands of various dimensions, occupying the situation of the plicæ. Wherever these stripes and bands exist, we find that the mucous membrane has been completely dissolved, and the submucous coat laid bare. They have thus a bluish or silvery grey aspect, while the mucous membrane which they inclose may be of its natural colour, red, brown, or yellow, and appears in isolated patches of various forms and extent." (*Elem. Forms of Dis.* f. iv.)

If much blood existed in the organ at the time of death, the softened part is of a blackish or sooty colour. In most cases we have seen it of a dull white, traversed by sooty lines, evidently the remains of bloodvessels the contents of which had been discoloured by the gastric acid. Both in man and animals the lesion is rarely observed in its greatest extent, (that is, with softening of the whole parietes and perforation,) unless the subject was in good health at the time of death, and had recently taken food. The slighter degrees of softening of the mucous membrane only, we have often noticed in cases of protracted disease, and we are of opinion, that it is often overlooked. Cruveilhier has described this cadaveric lesion as *Ramollissement pultacé*, to distinguish it from another which he considers morbid, and which he calls *Ramollissement gelatiniforme.* In both of them, the softening may go on to erosion and perforation. The gelatiniform softening is, according to Cruveilhier, an organic process, *sui generis*, a perversion of nutrition, without any trace of inflammation, suppuration, or gangrene; a kind of "retrogradation vers l'état gélatineux, muqueux." Andral points out the analogy between it and the softening of the cornea in animals insufficiently nourished.

The existence of this species, which is sometimes called *spontaneous gelatinisation*, Dr. Carswell and others are not disposed to admit. There is, however, a class of facts which we shall find great difficulty in explaining, if we believe that the gelatinous softening is always a *post mortem* occurrence. We allude to certain cases of children prematurely weaned, in which, after an illness characterised by peculiar symptoms, no other morbid appearance was discovered capable of accounting for them; and also to other cases which have occurred in adults, whose death took place after a few hours' illness, and the only serious lesion was that under consideration. The symptoms in the infantile cases are thus described by Cruveilhier:—"Une diarrhée verte, très-fréquente, semblable à de l'herbe hachée, si la maladie est intestinale; des vomissemens muqueux ou bilieux, si la maladie attaque l'estomac; une soif ardente, insatiable, tout-à-fait caracterisque; un amaigrissement très-rapide (quelquefois en douze heures); une prostration de forces excessive; une face decomposée, et decolorée; un assoupissement léger, interrompu par des cris plaintifs, et des contorsions; une mauvaise humeur que rien n'égale; un pouls lent et irrégulier, le froid des extrémités; voila la réunion des signes le plus propres à différencier le ramollissement gélatiniforme de toutes les autres maladies de l'enfance." (*Anat. Path.* liv. x.)

These coincide remarkably with the phenomena observed by Dr. John Gairdner, who published (*Ed. Med. Ch. Trans.*, vol. i.) a very valuable collection of cases of the same disease. Of the adult cases the following is a specimen:—"A young lady, previously in good health, was awakened at three one morning, with excruciating pain in the stomach, which nothing could alleviate. She expired seven hours after; and, on dissection, two holes were found in the back part of the stomach, surrounded with much softening of the villous coat." (*Christison*, p. 119.) The symptoms in this, as in other cases, were referred to the stomach; the person died after a short illness, and the only pathological alteration was this appearance in the stomach. Supposing we consider the softening and erosion to have been merely chemical, how are we to account for the symptoms and the fatal termination? Disease must have existed, and disease of the stomach; but this organ presents no sign of inflam-

mation, injury, or poisonous action; nothing but the peculiar softening. To the above facts it must be added that the softening has been found on the anterior part of the stomach, upon which it is difficult to imagine that the gastric juice could have acted. This happened in the case represented in Cruveilhier's plate; and in the celebrated case of Miss Burns, who was erroneously supposed to have died of poisoning. (See *Christison on Poisons*, p. 33.) Dr. Christison mentions that the late Dr. W. Cullen showed him a stomach in which the softening had commenced upon the *peritoneal* coat, and exposed the muscular fibres. Were it not for this fact, and the locality of the lesion in the fore part of the stomach, we might conclude with Dr. Gairdner, that even in morbid cases the gastric juice was the solvent agent, and that disease had rendered the tissue more soluble. This opinion has been also arrived at by Andral. (*Anat. Path.*, t. ii. p. 88.)

The subject requires still further investigation. But thus much appears certain, that whether the change in question is in all cases cadaveric, or in some of a morbid nature, it is not easily confounded with the action of any irritant poison, excepting oxalic acid. And even in the latter case, there are usually signs of vital reaction around the margin of the corroded part.

ULCERATION OF THE STOMACH.

Ulcers of the stomach, not produced by carcinoma, may be arranged under the following heads: — 1. Slight erosions of the mucous membrane, distributed over a surface exhibiting the effects of chronic gastritis; 2. Minute ulcers with red margins, often scattered over a pale surface; these result from inflammation of isolated follicles; 3. Ulcers penetrating the muscular, and even the peritoneal coat, the base being formed by an adjoining organ. These are circular or oval, and are bounded by hard margins, either elevated, or so much on a level with the surrounding membrane, as to appear to have been stamped out with a punch. They generally exist alone, and are situated either in the small curvature, or near the pylorus on the posterior surface. In the latter situation they have assumed an annular form. The edges are of a dead white, or grey hue, and their density is owing to hypertrophied cellular tissue. They are distinguished from cancerous ulcers by the absence of malignant deposit at the bottom of the ulcers. (See Cruveilhier, *Anat. Path.*, l. x.) 4. Ulcers of an irregular shape, with ragged margins, produced by gangrene. These are rarely, if ever, seen, except as the result of irritant poisoning.

It has been already stated that ulceration of the stomach, as a spontaneous disease, is a chronic action. The two first of the above species are the most common; and their symptoms and pathology are those of chronic gastritis. The third species are remarkable for being in some cases quite latent, until perforation of the organ has suddenly taken place. This lesion has frequently occurred in chlorotic females. The general condition of these subjects is obviously very favourable to the ulcerative process. In other instances, however, they are attended by the most distressing symptoms, closely imitating those of cancer; and we are not acquainted with any certain means of distinguishing them from the latter. We remember a case which exhibited every characteristic of cancer, both in the local symptoms, and in the general emaciation and cachexia; but which, after death, presented only a large clean-edged ulcer, in the pyloric extremity, close upon the orifice, with enormous dilatation of the stomach. The latter effect, as well as the great sufferings of the patient, were doubtless caused by the irregular action of the fibres about the pylorus, some of them having been destroyed by the ulceration. But although in some cases the diagnosis may be very obscure, in others we shall be assisted by the absence of the general signs of carcinoma on the one hand, or on the other by the presence of a circumscribed hardness in the epigastrium. The tumour, however, may be caused, as we have before remarked, by enlargement of the left lobe of the liver; nor will it suffice to say that such a disease would be

wanting in the purely gastric symptoms, such as mucous, or coffee-ground vomiting, pain after food, &c. for the stomach, as we have known, may be unnaturally adherent to the liver, and therefore so embarrassed in its movements as to produce every kind of gastric distress. If hæmatemesis should occur in a person who has for some time suffered from chronic gastritis, or if the patient's stools should present a dark pitchy appearance, indicating the presence of decomposed blood, we may strongly suspect ulceration of the stomach. It is very desirable to arrive at a correct diagnosis, not so much for the treatment as for the prognosis, which, in the simple ulcer, would be far less discouraging than in carcinoma; the former being capable of cicatrisation. The celebrated Beclard cured himself of this disease. The treatment is chiefly dietetical and palliative; consisting in a careful selection of such aliments as are found by the individual to be most easy of digestion, and in the administration of sedatives.

PERFORATION OF THE STOMACH.

Morbid perforation has often been called *spontaneous;* a term which might lead to the supposition that the lesion was a peculiar action, independent of other disease. The term, however, was first used to distinguish morbid perforation from that occasioned by corrosive poisons; for it was at one time supposed that the disorganisation was always the effect of such agents.

Perforation, from disease, has the following causes: — 1. Simple ulceration, beginning either in the mucous coat, and gradually advancing to the serous; or much more rarely beginning in the peritoneum; sometimes, when the ulcer has reached the serous membrane, the continuity is suddenly destroyed by laceration; 2. Carcinomatous ulceration; 3. Gelatiniform softening.

Cadaveric perforation is produced, as we have seen, by the gastric juice. The spleen, liver, diaphragm, and œsophagus, often share the action of the solvent liquid which has escaped from the stomach, or transuded through its tissue.

Although the stomach may be perforated by ulceration, it does not follow that its contents must escape, for the opening may be closed by adhesions of the neighbouring viscera, caused by extension of inflammation from the outer surface. But when the accident does occur, the symptoms are those of sudden and violent peritonitis. (See Peritonitis from Perforation.)

DYSPEPSIA.

Preliminary observations. —Acute dyspepsia.—Two forms.—Symptoms of the first. —Causes and treatment.—Symptoms of the second. — Causes and treatment. — Chronic dyspepsia. —Symptoms. — Local. — General. —Causes. —Nature. — General treatment.—Diet.— Regimen. — Treatment of particular symptoms. — Influence of gastric disorders upon other organs.

The term Dyspepsia (derived from δυσπεπτέω, to digest with difficulty) implies impeded or painful digestion, or as Dr. Todd has expressed it, any derangement of that function by which the aliment is converted into chyle.

It can scarcely be disputed that the liability of an organ to derangement is in a direct ratio with the complexity of its function. In the latter respect the stomach is surpassed by no other organ; for it has not merely to receive and retain its contents for a certain time, and then expel them by a simple propulsive action, like that of many other hollow viscera, but it must also keep them by its churning motion in a continual agitation, so that they may be effectually

subjected to a peculiar chemical process, the principal agent in which is a fluid secreted from its inner surface. These several actions afford so many occasions of derangement.

One source of disorder which the stomach shares with many other organs, is the large supply of blood required by its secreting function, and rendering it liable to suffer from the opposite states of plethora and anæmia. But it contains in itself another cause of disturbance, still more extensive and frequent in its operation, viz. its intimate sympathy with other organs, for which it is probably indebted to its liberal endowment with nerves, both from the cerebro-spinal centre and from the ganglia. So often is the stomach implicated in morbid affections of other parts, that some have supposed it to be the *primum mobile* of every disease to which the system is liable. There can be little question that disease of this organ is a fruitful parent of other maladies, both on account of its peculiar function and its wide spread sympathies; but we believe that it receives scarcely less injury than it distributes, and that the very disorder which it may have originated in other parts often recoils upon it with redoubled violence. The increasing prevalence of gastric affections in the present age, when to say the least, our mode of diet is not more irritating to the digestive organ than was that of our fathers, leads us to seek their origin in parts of the system on which modern habits exert a more direct influence; a search soon terminating in the nervous system, which, in the respective classes of the community, the unnatural hours, the enfeebling luxuries, the toil and excitement of the intellect, the commercial anxieties, the struggles of men, *sollicitè ambientes, callidè litigantes*, or of others who in a redundant population subsist only by the most ardent and emulous exercise of their inventive faculties, are constantly perturbing and paralysing. Upon a hasty view it might be thought needless to look beyond the excesses or errors of diet to which all men are more or less prone, for sufficient causes of the frequency of gastric ailments. But the stomach is so admirably organised, so capable of accommodating itself to all the apparently pernicious usage which in the selection of food it receives from the necessities, the vices, or the caprices of mankind, that were there no other source of disturbance the organ would perform its function with little impairment.

If the sensibility of an organ be an index of its liability to disorder from outward agents, which seems to be the case in the eye and in serous membranes, certainly this test is wanting in the stomach, which bears the presence of substances such as no other organ undefended by epidermis could tolerate. Here the ingesta are, as it were, suddenly deprived of their active properties; for the scalding liquid, the pungent spice, the acrid medicine, the frozen sweetmeat, nay, the mechanical irritant, are often forgotten when the impressions which they left upon the tongue, the fauces, and the gullet, have been effaced. The necessity for such an organisation that neither pain, nor the derangement of which it is the criterion, should be easily excited, is obvious from a moment's consideration of the difference between its circumstances, and those of every other hollow viscus. The heart, the bladder, the intestines, all receive substances, more or less chemically prepared for them, and differing but little in their composition at different times; but into the stomach are carried the most heterogeneous agents, which have received only a mechanical adaptation to the organ which they visit. The means by which the latter so often escapes injury of its structure, are probably the copious secretion of mucus, and the capability possessed by the mucous membranes of accommodating themselves to varying quantities of blood. To these we may perhaps add the diluting or neutralising action of the various aliments on each other.

But although the stomach in its healthy state is thus capable of resisting the seemingly deleterious influence of many substances used in diet, we must bear in mind, that when it has once declined from its natural tone, even the simplest of them may immediately become powerful irritants; just as the most pleasing

colours, sounds, or odours, may offend their respective organs when morbidly affected. Hence it is obvious that gastric disease, in the first instance slight or transient, incurs the risk of being kept up, recalled, or exasperated, whenever the subject of it is compelled to take nourishment.

Acute Dyspepsia.

Before describing the chronic, and more important form of this disease, we shall briefly notice two affections, slight in their character, and of short duration :—

I. The first may be called *acute* dyspepsia, or indigestion, corresponding to the *embarras gastrique* of French authors. The *symptoms* are anorexia, a feeling of weight and fulness at the epigastrium, nausea, and eructations, which often bring up bitter or acid fluids, or gaseous matters, tasting like sulphuretted hydrogen, and with these local disorders there are often conjoined pain in the loins, aching of the limbs, dull headach along the supra-orbital ridge, confusion, or incapacity of thought, and despondency. The tongue is white, sometimes loaded with a dry fur, but more frequently with a coat of thickish paste. The skin is cool, the pulse small and soft, the face pale, and the eyes look dull and heavy. The patient may continue in this state for several hours, till vomiting occurs either spontaneously or by the help of medicine. The substances ejected consist of undigested food and mucus. The evacuation of the stomach is generally followed by a feeling of great relief, and the sympathetic disorders soon subside. It often happens, however, that the stomach is left in a state of considerable debility, preventing the patient from resuming at once his usual mode of living.

The most frequent *cause* of an attack of this nature is excess in eating when the stomach is debilitated, or the use of indigestible aliments. But in many cases the food is not particularly in fault either as to quantity or quality, but something has previously occurred to impair the power of the stomach; such, for instance, as great bodily fatigue, mental exhaustion, intemperance, broken rest, depressing emotions. The reception of unwelcome intelligence during a meal is quite adequate to the production of such an attack as we have described.

The first step in the *treatment*, is to administer an emetic, consisting of ipecacuanha wine, or salt and water. When the stomach has been thoroughly cleared, and the nausea has passed off, a dose of aperient medicine should be given. Rhubarb and sulphate of magnesia, with aromatic confection, will form a good combination; or if the first of these articles is repugnant, we may exhibit the salts dissolved in infusion of roses, to which the compound tincture of cardamoms may be added. If this also is rejected, the best resource will be pills of the compound extract of colocynth, with a small quantity of calomel or blue pill. Effervescing draughts, made with carbonate of potash and lemon juice, or soda water, will be found useful in restoring the tone of the stomach. The patient must abstain from solid food till the following day. The best articles are arrow root, well boiled gruel, and other farinaceous substances.

Sometimes after an attack of this nature the stomach falls into a state of chronic weakness, the symptoms and treatment of which will be discussed presently.

II. Another form of acute functional disorder, to which the stomach is liable, is what passes under the popular term of *bilious seizure.* Many of the symptoms in this affection are the same as in the former; but the spontaneous sickness is more violent, and not attended with the same amount of relief; there is also more general disturbance; thus there may be rigors succeeded by smart fever, and most distressing headach. The mouth is parched, and the tongue covered with a yellowish fur. The matters vomited taste very bitter, and are of a yellowish or green colour, according as the bile has been acted upon or not by the acid in the stomach. The patient is seldom relieved till the bowels

have been freely evacuated, though we have known the symptoms subside almost suddenly, some hours before the occurrence of a stool.

The attack is generally preceded by indisposition, languor, dulness, chilliness, loss of appetite, and giddiness. Some persons can foretell its approach by derangements of sight, consisting of general indistinctness, or a sensation of darkness; sometimes only the half of an object is visible. With these visual disturbances there may be noises in the ears, and anomalous affections of tactual sensibility, such as tingling or pricking in the hands, or along one or two of the fingers, pain in the right shoulders, &c. The face and conjunctivæ are generally suffused with a yellow or muddy tint.

The cause of this disorder is regurgitation of bile from the duodenum into the stomach, and probably the previous derangements are owing to an excessive secretion of this fluid, and to the accumulation of it in the duodenum from some obstruction in the bowels. Some persons are constitutionally liable to such disorders, and are said to possess the bilious temperament. The attack may be brought on by inattention to the bowels, disturbance of the emotions, excess in eating and drinking, and by certain states or variations of the atmosphere. Of the latter, the most unfavourable conditions perhaps are humidity, preventing due evaporation from the surface of the body, or an east wind diminishing the vital action of the skin.

Treatment. The vomiting may at first be assisted by diluents, but it must not be encouraged indefinitely merely because a feeling of nausea continues. Nor is the repeated ejection of bile any proof that vomiting is still required, since this action will alone be sufficient to force the bile into the stomach. The first opportunity of quiet must be seized for administering a small pill containing calomel or blue pill. Two or three hours afterwards an aperient, in the form of a draught or pills, may be administered; if the stomach rejects these medicines, we must endeavour to excite the action of the bowels by clysters. The sickness may often be allayed by effervescing fluids, which are rendered more efficient by the addition of a small quantity of brandy, or of a few drops of laudanum. A sinapism to the epigastrium, followed by the application of flannel sprinkled with warm laudanum, is of great service in these cases. An alkaline draught, consisting of half a drachm of carbonate of soda, or of condensed magnesia in plain water, is sometimes the best remedy.

The headach and fever generally subside when free evacuation of the bowels has been effected; but the former may be mitigated by cold applications, and the latter by effervescing salines. After the attack has gone by, it may be proper to adopt a course of mild alteratives, conjoined with a light vegetable tonic. The Cheltenham waters are eminently useful to persons who suffer from bilious derangement.

Chronic Dyspepsia.

The *symptoms* of chronic dyspepsia are *local* and *general*. The former may be arranged under, 1. disordered sensations; 2. disordered movements; 3. disordered secretions.

1. Impaired appetite, or absolute deficiency of it, called *anorexia;* disgust for food, and nausea; excessive appetite, or *bulimia;* perverted, or *pica;* uneasiness at the epigastrium, sometimes amounting to pain, most commonly after food, but occasionally in the intervals of eating. Sensations called *gnawing, raking*, sometimes with feelings of sinking and emptiness, or with fulness and weight. 2. Vomiting, chiefly of food imperfectly chymified, with mucous or bilious matter; cramp, eructation, rumination, hiccup. 3. Flatulence, ejection of acid, acrid or bitter fluids; sometimes the fluid is thin, glairy and insipid, and thence called water-brash.

The *general* symptoms are almost co-extensive with the whole economy; we shall not attempt to set down more than the most common and prominent. The class of feelings attributed by some physiologists to a *sixth* sense, having

reference to the general condition of the body as to health, strength, elasticity. &c. are in dyspeptic subjects very remarkably affected; producing discomfort or *malaise*, a sense of indisposition, lassitude, or an aching weariness; which patients often emphatically designate as wretchedness. It is generally but not always coupled with dejection, or anxiety, and very often with irritability of temper, and incapability of taking pleasure or interest in any thing, whether in the physical or in the moral world. The intellect is oppressed, and the senses are dull or deranged; to the latter affections belong wandering pains, itching, pricking, noises in the head, *muscæ volitantes.* The muscles are weak, and sometimes spasmodically contracted. Headach, particularly over the eyes, is often complained of. The sympathies in the respiratory system are not very striking, at least in the earlier periods of the malady. When they do occur, it is in the form of oppressed breathing, hard cough, and morning expectoration. The action of the heart is not unfrequently irregular, or intermittent, or palpitating; sometimes there is a *sense* of palpitation though none can be detected externally. The bowels are generally sluggish, either because a torpor similar to that of the stomach extends through the fibres of the whole canal, or because the secretions, both hepatic and intestinal, are deficient; but sometimes the alvine evacuations are regular and natural. The aspect of the urine is variable, one day dark-coloured, depositing uric acid, another preternaturally pale; often turbid, and covered with a many-coloured film. The tongue is for the most part coated with a white fur, often pallid, and sodden, the breath fœtid, and the skin perspiring. There is a want of equable warmth, the patient complaining of general chilliness, or of cold feet; but sometimes at night there is feverishness, with dreamy, unrefreshing sleep. The countenance for the most part betrays the frame of mind; and the eyes are often suffused with a dull redness, or have a lack-lustre appearance.

The symptoms thus cursorily described are grouped in every conceivable variety. With one the local predominate, with another the general. Often the patient's own account is fixed on some one symptom such as the uneasiness after food, or the flatulence, or the general weakness. The disease may come on gradually, or appear at first in transient attacks, attributable to irregularities of diet, and afterwards become permanently established.

Causes. Early life is very little subject to dyspepsia, as an idiopathic complaint; but it may appear at any time after puberty, though it is most common in middle age. Women are considered by some to be more subject to the disorder than men, and our own experience rather accords with this view, though it is difficult to speak with precision as to the relative frequency of a disease so commonly met with in both sexes. Persons of a nervous or phlegmatic temperament, or of a habit debilitated by long illness, loss of blood, profluvia, insufficient nourishment, unhealthy atmosphere, broken rest, are predisposed to dyspepsia. The enervating effect of luxury and indolence may become manifest in this way; and the apparently opposite agency of mental labour and bodily fatigue. Long perseverance in the use of articles indigestible more or less to all, or which have been found to disagree particularly with the individual; irregularities in the times of taking food, and in the quantities taken; sudden changes of aliment, the frequent employment of narcotic medicine, the abuse of tea and coffee, the use of tobacco, whether by mastication, smoking, or in the form of snuff, exclusive addiction to vegetables, may so weaken the powers of the stomach that the slightest disturbance of the health developes the disease. The temporary aggravations may often be traced to substances particularly unwholesome, as crude fruits, rich dishes, pastry, &c. Upon no subject is it more important to put pointed questions to our patients. They talk in general terms of living regularly and moderately, and upon plain and wholesome food; yet when asked to specify the substances partaken of, the hours of eating, the amount of the meals, the degree of bodily exercise, &c. they confess a number of circumstances fully adequate to account for their symptoms. When the examination, however, does not develop facts of this

kind, and there is no evidence of any cause of debility in the system, we may suspect the operation of some mental or moral cause, such as an overstrained intellect, grief, disappointment, anxiety, &c. Dyspepsia is a common accompaniment of nervous diseases, particularly hysteria and hypochondriasis.

Nature. The pathology of this disorder is not absolutely demonstrated; but we may reasonably infer that the fault is due, either to an insufficiency or to an impairment of the gastric juice, with or without an atonic condition of the muscular fibres of the stomach. Gentle agitation of the food, its easy solution, and gradual propulsion towards the pylorus, are the chief requisites for healthy digestion; and it is therefore obvious, that changes in the gastric secretion, and irregular contraction or weakness of the muscular coat, may, together or singly, so disturb the process as to give rise to the symptoms of dyspepsia. One of the most likely circumstances to produce deficiency of the gastric juice is an anæmial condition of the mucous membrane, which may be either a part of a general exsanguine state, or chiefly local, in consequence of excessive determination to some other organ, as for example, the brain. But a state of congestion, most probably of the passive kind, may be in some cases suspected. The physiology of the nerves of the stomach is not in a settled state, but there is every reason for believing that disordered innervation of this organ plays a very important part in the pathology of dyspepsia. But how much is due to alteration of the capillary circulation, and consequently of the secretion under the agency alluded to, and how much to mere derangement of the *motions* of the stomach, is yet to be determined.

Treatment. The chief indications are to impart tone to the stomach; and to remove the more urgent symptoms. The first object must be attempted, not only by remedies directed to the organ itself, as well as to the other parts of the digestive apparatus, but also by measures capable of acting on the stomach through the general system.

1. As a general rule, the treatment may be commenced by administering medicines calculated to remove any cause of irritation in the stomach and bowels, and to promote the healthy secretion of bile. Certainly, unless the constipation which so commonly attends the disease be removed, and its recurrence guarded against, it will be quite in vain to attempt the use of any medicines corrective of the stomach itself. Whether an emetic should precede the aperients must depend on the particular case; if the tongue is much loaded, and the patient complains of oppression at the epigastrium, and there are no contra-indications in the habit, such as pregnancy, a tendency to hæmorrhage, hernia and the like, the subsequent treatment may be considerably facilitated by an emetic dose of ipecacuanha. If the attack is recent, and especially if referrible to excess, or any other error of diet, the indication is still more obvious. In the choice of aperient medicines, we must bear in mind that they are not to be administered with any revulsive object in view. Those are the best which effectively unload the great intestine, and gently solicit the secretions in the upper part of the canal without producing irritation. The latter effect may be suspected when there is much mucus in the stools. We generally prescribe a small quantity of blue pill, with compound galbanum pill, or with a little extract of henbane, aromatic powder, and a grain or half a grain of ipecacuanha, to be taken at bedtime, for a few nights in succession, and to be followed in the morning by an aperient draught.

Subsequently, if regular evacuations cannot be secured by the kind of diet adopted (an object of the greatest importance), the patient may take every night the compound rhubarb pill, or a combination of this with the compound colocynth pill, and it will be much better for him to take daily the smallest quantity capable of producing the desired effect, than to have recourse to more active means at longer intervals.

After this preliminary treatment, and having directed a plan of diet, we may apply the more directly local measures, consisting of medicines calculated to remove the asthenic condition of the stomach. These belong chiefly to the

class of tonics. Their precise mode of operation in this disease, is by no means ascertained; and the notion, once so prevalent, that they give firmness to the muscular fibre, is much too limited to explain their influence. It might be supposed that they act much in the same way, as when they impart strength to the whole system, that is, through the nervous system, or even that the effect on the stomach is only a part of the general operation. But many of this class of substances are too local in their action to allow of such an interpretation; and on the other hand it has been thought, with much justness, that the tonic influence of many of them on the whole system, has been secondary to the improvement of the stomach. The change produced in the gastric membrane, and its secretion, by their direct application has been too much overlooked, though attention is called to it by an abundance of analogies in the operation of medicines which improve the other parts of the canal. At the same time an action upon the nerves and muscular fibres may be presumed, though how much importance is to be assigned respectively to these several modes of action can scarcely be even conjectured.

It is well to commence with some of the lightest vegetable bitters, such as cascarilla and calumba, which may give way in time to gentian, quassia, and chirayita. The form most generally suitable is that of infusion. Rhubarb infusion is an excellent medicine to begin with, having stomachic properties not to be explained by the slight bitter which it contains. We have no doubt that it acts chiefly on the gastric secretion. The good effect of these remedies is much assisted by combining with them carbonate of soda, magnesia, or ammonia, and a warm tincture. But the use of these and many other additions will be more apparent when we come to speak of the means employed against particular symptoms. Lime water, creasote, trisnitrate of bismuth, and nitrate of silver, are some of the most valuable of our resources in this disease, because they have the twofold advantage of relieving urgent symptoms, and acting permanently upon the gastric surface. The same obtains to a certain extent with the mineral acids, which may be exhibited in combination with the bitter infusions, or with some of the aromatic waters. In some persons it is found that the vegetable tonics suit the stomach better, when assisted by carbonic acid.

They may be known to disagree not only by complaints of nausea, uneasiness, headach, feverishness, but also by the state of the tongue. The presence of a fur on the tongue is generally a sufficient contra-indication to their use, but not in all cases; for with some this state is habitual, and with others, especially persons of relaxed habits, it disappears during the exhibition of tonics. When the bitters cannot be continued, the mineral acids are often excellent substitutes. In many cases the only complaint against the vegetable tonics is of a negative kind, namely, that they produce no sensible effect. We may then try the more potent tonics, such as preparations of iron, and quinine, either singly or in combination; the extract of hop is a good addition when the sensibility of the stomach is morbid, or the Extr. Papav. Alb. The iron may be advantageously administered as a soluble salt in combination with infusion of calumba. In many cases we have seen great benefit result from a combination of Aqua Calcis and Dec. Cinchon. Strychnia has also in our experience proved a valuable remedy, especially in nervous subjects. But for many patients all these remedies sink into insignificance when compared with the mineral springs, — the carbonated waters of Spa and Seltzer, the thermal springs of Bath, and Carlsbad, and the chalybeates of Cheltenham, Tunbridge Wells, Pyrmont, &c.

The *diet* proper for dyspeptic invalids is one of the first things to claim our attention, and is often the subject which the patient for obvious reasons most presses upon us; but he is more apt to seek information respecting the kind of food, than as to the quantity and the intervals at which it should be taken. Five hours may be considered a good average allowance to the stomach for the performance of its duty and the subsequent repose. A much longer period is exhausting to the general system; a shorter is teazing and fatiguing to the

stomach. The following brief sketch of a diet suitab.e to many dyspeptics, will give a general idea of the proper quantities and qualities of aliments, but may need many modifications and adaptations in particular cases:—

Breakfast may consist of light cocoa with bread somewhat stale, and a small mutton chop, or an egg lightly boiled, unless there be any reason in the general habit to contra-indicate much animal food. The cocoa should not be prepared with milk, and if even in its lightest form it does not appear to agree, coffee or weak black tea may be substituted. The quantity of fluid should not exceed one breakfast cup, unless we can persuade the patient to begin the meal by taking with the meat and bread half a tumbler of cold water. In some cases we have seen the best effects result from confining the breakfast to the latter articles, and taking no warm fluid at all.

The *dinner*, which should take place at one or two p. m., supposing the breakfast hour to have been eight or nine, must be almost as simple as the latter meal. If the patient attempts much more than meat, bread, and well boiled rice, he will be pretty sure to provide trouble for his stomach. The best meats are venison, mutton, tender beef, and game: fish, and the white meats, including poultry, are very doubtful articles. It is true that some of them are often prescribed in convalescence from acute disorders, and thence we imagine has originated the common notion of their fitness for invalids in general. In the cases alluded to, the reason for ordering them is, that they are less stimulating and heating than the browner meats, though less digestible; but this is no recommendation to them in dyspepsia. We believe that in a large majority of cases the use of vegetables ought to be forbidden, though the patient will often plead hard for them, and especially for potatoes, which he fancies to be peculiarly harmless. But this root, valuable as it is for the amount of nutriment which it contains, requires a powerful digestion to extract its virtue. Pastry, sweetmeats, preserved fruits, are all inadmissible. Patients, when condemned to restrictions of this nature, are fond of quoting cases among their friends in which every variety of food is taken, and in which the forbidden articles may even constitute the staple nourishment; but the best answer to such remarks is, that, as "to the pure all things are pure," so, in one sense, to the whole all things are wholesome. A moderate quantity of fluid is not objectionable, as it assists the diffusion of the aliment over the gastric surface; the most suitable is wine and water, in equal proportion, about two ounces of each. The best wines are old Sherry, Madeira, Hock, or Moselle. In some cases wine of all kinds produces acidity. We have then a good resource in diluted brandy.

Dessert cannot be enumerated among the proper refections of the dyspeptic. Even if some kinds of ripe fruit are allowed, it must not be at this period, when the stomach should be as little embarrassed as possible.

Three or four hours after dinner, a cup of coffee may be taken, or if the patient have no aversion to it, a cup of cocoa, with dry toast, or biscuit. The supper may consist of oatmeal porridge, arrow-root, sago, or a biscuit with wine and water: the first of these articles is of great service in assisting the action of the bowels.

On reviewing the above sketch it may strike the reader that the aliment is too digestible; he may think that the digestive apparatus as a whole is adapted to a great variety of food, a certain proportion of which must become excrementitious, and which the lower part of the canal is specially designed to receive, and consequently that in taking food of too soluble a description we deprive the large intestine of the stimulus which it was intended to receive, and thus produce constipation. This reasoning is applicable to a person in health; but from a weakened stomach, so much food is apt to pass imperfectly chymified, that should the ordinary kinds and quantities be taken, there is fear of burthening the intestines with a larger amount of excrementitious matter than they are fitted to dispose of, and therefore of inducing a constipation of a far more objectionable kind than the other.

The general regimen of the dyspeptic may be comprehended in the following directions. He should every morning either sponge the whole body with salt-water, and use diligent friction afterwards, or take a shower-bath, at such a temperature as ensures a gentle but not violent reaction. He should use regular exercise, and if possible by walking. It may be varied by horse-exercise, and in some cases the latter is the only kind that can be kept up to a sufficient extent. When the weather prevents out-door exercise, some substitute for it must be found at home. Regular and early hours for rising, and retiring to rest, must be observed ; occupation of an interesting kind must be sought, sufficient to divert the mind from the bodily ailments, without occasioning great anxiety. Intellectual exertion must be avoided after meals, lest the determination of blood, required in the stomach for a due secretion, should be withdrawn by the brain.

2. The second indication is to remove or mitigate particular symptoms, such as pain, pyrosis, flatulence, heartburn, palpitation. Of all of these it may be remarked that they often yield to the treatment directed under the first indication ; but, in many cases of long standing, in which the asthenic condition of the stomach is irreparable, we are obliged to seek means for the relief of the more prevailing though partial evil. The remedies, proper for the pain and the pyrosis, will be considered under the articles GASTRALGIA and GASTRORRHŒA.

Flatulence. In its milder degrees little more may be necessary than one of the carminative waters, with the addition of carbonate of soda or ammonia. When the symptom is obstinate our remedies must be more active. A combination of magnesia, rhubarb, and cinnamon, or mint water, with Sp. Ammon. Fœt. often answers our purpose. The compound Galbanum pill, with a grain of capsicum, the Inf. Armorac. Comp. and the Sp. Æth. Comp. are good medicines. In some cases we have found creasote, and in others the Ol. Terebinth, succeed where a great variety of medicines had failed. Flatulence is sometimes accompanied by a spasm of the respiratory muscles, producing the symptom of angina pectoris, especially in gouty subjects. We have often employed in such cases a combination of magnesia and carminatives, to which valerian, castor, and Hoffmann's anodyne liquor may be added with good effect.

Heartburn. This is often accompanied by a sense of acidity in the mouth or throat; in other cases the matter eructated produces an acrid sensation in the throat, but not any soreness. Alkalies and alkaline earths are the remedies commonly employed either singly or together. The relief which they effect is seldom more than temporary ; neutralising the acid matter in the stomach, but not preventing its reproduction. We may except, however, the Liq. Potass., and the Aq. Calcis, which appear to have a more permanent action. In obstinate cases experience has taught us to rely much more upon the seemingly homœopathic help of the mineral acids, which, by giving tone to the gastric membrane, subvert the cause of the evil instead of merely parrying its effects.

Nausea and vomiting. Effervescing draughts, with or without the addition of laudanum may be first tried, or the diluted hydrocyanic acid in doses of from three to five minims. Carbonate of magnesia in plain water has succeeded, in our experience, when a great variety of other means had been unavailing. Sinapisms and blisters to the epigastrium, or linen dipped in hot laudanum, may be used with advantage; very often have we found that the best remedy of all was brandy taken undiluted, in tea-spoonful doses at short intervals, and scarcely less often we have found that nothing was of any avail, but entire abstinence from ingesta of any kind, whether food, drink, or medicine, for several hours. Creasote is frequently an effectual remedy in checking sickness and vomiting.

Palpitation. This frequent attendant upon stomach complaints may often be referred to some particular article of food, and its relief must be waited for till digestion has been accomplished, or the substance has passed out of the

stomach. In many instances it depends on accumulations in the colon, and a full injection containing turpentine or assafœtida is the best remedy. In some dyspeptics, acidity in the stomach is always accompanied with palpitation; in such cases alkaline medicines give immediate relief. When it cannot be referred to such causes as these, but rather to nervous irritability, we must have recourse to antispasmodics, as valerian, castor, and assafœtida, with morphia, or prussic acid. Prussic acid, and digitalis in combination, answer extremely well. In some cases a course of tonics is often the best resource, and no medium of that class is preferable to the sulphate of iron with aloes, or with the compound galbanum pill.

We shall now proceed to notice the influence of gastric disorders upon other organs.

1. *The intestines.* Setting aside the special sympathy existing between these organs and the stomach, as parts of the digestive apparatus, it is obvious that the action of the stomach upon the food being the first of a series of changes, and preparatory to those which occur in the other divisions of the canal, a fault in the first stage of the process must interfere with those which are subsequent. Thus it is the office of the duodenum to act upon chyme, but if this is imperfectly elaborated, the change in the duodenum must be likewise imperfect, even supposing that this viscus were not disturbed by the presence of matter ill-adapted to its sensibility. But the latter result very frequently ensues. The undigested matter either acts as an irritant to the mucous membrane or follicles, or is negatively injurious by the absence of the kind of stimulus requisite for the secretions of the bowel, as well as for those of the liver and the pancreas. In its further progress it produces similar results, till it arrives at the cæcum and colon, where it occasions either diarrhœa or constipation, according as it gives rise to irritation, or by its deficiency in certain principles (particularly in the bile) fails to excite the peristaltic motion, or the follicular and other secretions of the mucous membrane. Such mischief might be expected by one conversant with the physiology of the alimentary canal, but it is proved by the symptoms which occur in dyspeptic cases.

The intestines participate in disorder of the stomach not only through the contents of the latter, but also by sympathy. The continuity of the mucous membrane renders them liable to the extension of irritation from the stomach, but this happens particularly in the duodenum. In the large intestine, however, we may sometimes infer an opposite condition of the mucous membrane, from the constipation attendant upon gastritis, as if the greater afflux of blood to the stomach caused a state approaching to anæmia of the bowel. In some instances, the rapid communication of disorder from the stomach to the colon seems to depend on the sympathy of contiguity; as, for example, when upon the ingestion of food which occasions nausea and uneasiness, the patient is seized almost at the same time with tormina, and desire to go to stool.

2. *The liver.* The frequent conjunction of gastric and hepatic disease may sometimes perhaps be accounted for by functional sympathy; but it is probable that the duodenum is in most cases the medium of communication. Structural disease of the liver, consequent upon chronic gastritis, has been referred to inflammation of the veins. That this may occur in some instances we do not doubt, but in the majority of cases we think it probable that the greater quantity of blood, transmitted from the inflamed membrane, may cause plethora of the portal circulation, and in this way lead to more serious disease

3. *The organs of respiration.* The disorders of this system most commonly associated with gastric disease may be classed under three heads: 1. spasmodic, 2. catarrhal, and 3. organic. To the first belongs the hard dry laryngeal cough of inflammatory dyspepsia; the *laryngismus stridulus*, incident to gastric irritation in the infant; and the spasmodic dyspnœa or asthma, not unfrequently attendant on chronic derangements of the stomach. The distribution of the pneumo-gastric nerve sufficiently explains these sympathies. The catarrhal diseases are bronchitis, acute and chronic, and bronchorrhœa; the

former commonly associated with gastritis in its different degrees; the latter causing the loose morning cough of the dyspeptic. In what degrees these affections are dependent on the sympathy of mucous membranes in general, or on one of a more special description existing between the stomach and the lungs, and maintained by the ganglionic nerves, we do not presume to determine.

The disease of the pulmonary structure which most frequently ensues upon stomachic disorder, is tubercle. The first production of this disease, so far as it is dependent upon, and not merely concurrent with, gastric disorder, is best explained by the deterioration of the blood consequent upon the latter.* After this change has been produced, the bronchial or pulmonary congestions, sympathetic with that form of subacute or chronic gastritis to which strumous habits are liable, may lead directly to the morbid deposit. The subsequent changes in the tuberculous disease, with the accompanying bronchitis and pneumonia, are greatly exasperated by gastric irritation.

4. *The heart.* The cardiac affections dependent on disorder of the stomach, are chiefly if not entirely functional, consisting of palpitation, syncope, and irregular or intermittent action. It is true that functional palpitation may induce hypertrophy in the same way that increased action of other muscles will augment their nutrition; but the latter change is then connected only indirectly with the morbid condition of the stomach. The juxta-position of this organ and the heart will account in some measure for their close sympathy, independently of the nervous connections; and even the mechanical condition of the stomach must produce considerable influence on the heart, as when, for instance, distended with food or flatus, it presses the diaphragm upwards. When the structure of the heart is in any way diseased, one of the surest methods of averting the paroxysms of functional disturbance, is to prevent irritation of the stomach.

5. *The brain.* The symptoms of deranged sensation and motion detailed under chronic gastritis, dyspepsia, and gastralgia, evince the extent to which the function of the brain may be involved in diseases of the stomach, in cases of recent disease.

In cases of recent disease, the cerebral irritation excited by gastritis is sometimes so intense, as to supersede or to withdraw attention from the primary disorder. The chronic affections, hypochondriasis, melancholia, and even mania, have appeared to be removed or mitigated by treatment directed solely to the digestive organs. The headach occasioned by the digestive process has been often referred to a congestion of the brain, sympathetic with that of the stomach; but in many cases we are convinced that it is more of a neuralgic nature, the pain being limited to particular regions of the head, as to one eye-brow, to the occiput, to the mastoid region, or to the vertex; and often accompanied with superficial tenderness. The occurrence of apoplectic fits, soon after a meal, seems to imply a direct sympathetic determination to the brain; but we incline to the belief, that these attacks are mainly owing to the increased force of the circulation, produced both by the increased action of the heart, and the augmented mass of the circulating fluid generally.

6. *The spinal cord.* Derangements of motion produced by irritation of the spinal cord very frequently accompany gastric affections; such are tremors, partial paralysis, and convulsion. The last of these combined with coma, in the form of epilepsy, are especially common in early life. Tetanus has been traced to acute gastric inflammation. Chorea and the convulsive movements of hysteria afford many examples of the connection of spinal disorders with morbid conditions of the stomach.

7. *The skin.* The cutaneous diseases most frequently observed in conjunction with gastric disorders have been already noticed. We shall only now remark that this class of maladies will furnish many instances of the opposite principles of revulsion and sympathy: for while on the one hand, the most invete-

* In cases of this description the duodenum, and other parts of the intestinal trunk are generally implicated, as in the strumous dyspepsia so faithfully described by Dr. Todd.

rate forms of skin disease run *pari passu* with the disease of the stomach, it not unfrequently happens that the supervention of the former causes the latter to disappear; while their subsidence is soon followed by a return of the gastric malady. This observation is not confined to diseases of the skin; thus we have known asthma not only concurrent with dyspepsia, but vicarious of it.

GASTRALGIA.

Symptoms.— Complications.— Nature.—Causes.—Treatment.

This affection corresponds to the gastrodynia and cardialgia of some authors, the morbid sensibility of the stomach described by Dr. James Johnson, and the irritable gastric dyspepsia of Dr. Todd. It is characterised by pain in the epigastrium, but as this is a symptom common to other affections of the stomach, it is requisite to describe the nature of the pain and the attendant symptoms which distinguish what is meant by gastralgia. The pain is generally acute, and capricious in its accessions. Thus at one time it is greatly increased, at another diminished by food. The former effect is more common, and the degree of it is often such that the patient dreads the time of eating though his appetite is craving. Pressure is generally a relief, but not so invariably as some authors represent it to be. The pain often extends to the left side and between the shoulders, and is accompanied by pulsation in the epigastrium. There is seldom any fever; on the contrary, the patient often complains of coldness. The tongue is generally clean, though apt to be pale. The bowels are costive, the urine is for the most part unaffected, but in some cases we find it more copious and colourless than usual. The temper is irritable and captious. The sympathies in distant organs add dreadfully to the sufferings of the patient. Such are headach, of a tense character, neuralgic pains in the arms, spasms of the bladder and rectum, shooting pains in the testes, priapism, &c.

When the disease has been of long duration, the subject of it becomes a prey to morbid gloom. His ideas are all pervaded by sadness, and they borrow this character from an ever present conviction of the miserable condition of his health, which even in the intervals of pain he never forgets. That happy unconsciousness of bodily organs which belongs to sound health, is now unknown to him. He has acquired an irrepressible habit of attending with intense earnestness to his corporeal sensations. Even the external world becomes a dismal reflection of his own mind.

Gastralgia is often complicated with chronic gastritis, and with gastrorrhœa; in its uncomplicated form it is distinguished from other diseases of the stomach by the circumstance, that the pain is the predominant symptom, and that, this being overcome, the attendant local evils also give way. The food is digested without difficulty; there is no nausea, no distension, no heartburn. Moreover we do not observe the febrile symptoms and cutaneous diseases attendant on chronic gastritis, nor the emaciation, and sallow complexion, characteristic of carcinoma. The diagnosis will be much facilitated by considering the habit of the individual, and the circumstances to be mentioned presently as predisposing causes.

Nature. Pathologists are pretty well agreed in referring the symptoms of this malady to some alteration in the gastric nerves, corresponding in many respects to that which produces neuralgia in other parts of the body.

Causes. Females are more frequently attacked by Gastralgia, because they more frequently possess the neurotic irritability, and are also subject to causes of debility, which particularly dispose to this disease. No age perhaps is exempt, but we rarely observe it in children or in persons far advanced in life. Deficiency and depravation of food, hæmorrhage, profuse discharges from the

mucous surfaces, anæmia, chlorosis, diseases attended by long suffering, often induce a general susceptibility in the nervous system, which only requires a slight local irritation to develope the disease under consideration. The neurotic diathesis, which has been described elsewhere (see PATH. INTRODUCT.), may be inherited or acquired. As the product of outward circumstances acting upon the mind, we every day see it exemplified in persons whose pursuits involve a constant strain upon the energies of the intellect, and call into play the struggle and anxiety of strong contending emotions. Such are the violent alternations of hope and fear, confidence and doubt, ambition and despair, experienced in the agitations of politics, and in the competitions incident alike to professions and to commercial occupations. This subject the reader will find admirably illustrated in Dr. James Johnson's work already adverted to.

The *exciting* causes are for the most part such as act locally upon the stomach. The use of indigestible substances, such as crude vegetables, or fruit, dried salt meat, oily fish, &c. will easily bring on the disease where the predisposition exists. The same may be said of stimulant potions, and very cold liquids. When the morbid irritability is once established, it is astonishing to observe what slight causes may induce an attack of pain. A trifling surprise, an angry word, the least opposition to the wishes, will produce this effect in an instant, through the sympathy between the brain and the stomach. The agents of a local operation it is impossible to enumerate, for every article of food or medicine may be a cause of offence, even those which are apparently most bland and soothing. The cases met with among the working classes may generally be traced to the combined influence of excessive labour, a vitiated atmosphere, and scanty or innutritious diet. Dr. Kay observes (*North of England Journal*, 1830), "That much must be attributed to the qualities of the diet is obvious, since comparatively few cases of gastralgia present themselves amongst that class of operatives which receives better wages, obtains a simple and better diet, and whose members are more regular in their habits. Meagre food cannot fail, in the circumstances alluded to above, to derange the process of chylifaction, to disorder the digestive organs, and to impair the functions and morbidly increase the organic sensibility of the stomach and intestinal canal, thus inducing Dyspepsia, Gastralgia, and Enteralgia."

Treatment. The objects are, 1. to subdue the local irritability; 2. to prevent occasions of disturbance; and, 3. to correct the general habit.

1. For the fulfilment of the first indication, the remedies to which we naturally have recourse, are narcotics. Prussic acid and morphia are those on which most reliance may be placed; but in some cases the weaker substances of this class, such as henbane and hops, answer better. Stramonium is a valuable remedy, alone, or in conjunction with belladonna. But we must remember that sedatives are to be administered not only to quell the pain, but also to blunt the sensibility of the nerves, and thus to gain time for the use of measures calculated to produce a more permanent impression upon the system. Thus it is useful to combine morphia with aqua calcis, morphia with bismuth, opium with sulphate of iron, &c. The addition of nervine medicines is occasionally serviceable, as of camphor, assafœtida, and musk.

There is one medicine often given to effect the present indication, which does not fall under the list of sedatives. We allude to the nitrate of silver, first introduced as a remedy for this disease by Dr. J. Johnson. This distinguished physician was led to the exhibition of the medicine by observing its great power of lessening irritability on other tissues, and he seems to think that it acts specifically upon the nervous extremities. Induced to employ it by Dr. Johnson's recommendation, we have found it a most valuable resource in a great variety of stomach affections; but our experience inclines us to think it more efficacious in certain cases often met with in practice, which present a combination of nervous irritability with chronic or passive congestion; and we therefore attribute its good effects rather to its action upon the capillaries than upon the nerves, and this view seems to us to be more in ac-

cordance with its known efficacy in diseases of parts more subject to actual observation, as the conjunctiva, the mouth and throat, the rectum, the urethra, and the skin.

Upon the external use of anodynes, we have nothing to urge in addition to what has been said under gastritis and carcinoma.

2. This indication involves the difficult subject of diet. The difficulty consists in reconciling the local with the general treatment, for the articles which tend to invigorate the system are unfortunately those of which the stomach is least tolerant. We cannot for instance expect to make much progress in the cure of an anæmial hysterical subject, if in order to avoid irritation of the stomach we keep her upon farinaceous food, and withhold tonics; the plan which we have found most practicable, has been to begin with a very light kind of aliment, such as gruel thoroughly boiled, arrow-root, rice, or the composition sold under the name of farinaceous powder, using at the same time the sedatives of which we have spoken, and procuring a regular and healthy operation of the bowels by mild laxatives and enemata. Having thus subdued the excessive irritability of the stomach, we venture to order broth or soup for a day or two; but we never feel satisfied till we have induced the patient, often in strong opposition to his preconceptions, to try solid tender meat, which may be taken with bread only, and a little weak brandy and water. It will often be necessary to encourage him to continue this diet in spite of the uneasiness which it at first occasions; and he is generally rewarded for his perseverance. In some cases, indeed, it is the kind of diet which produces least inconvenience; while a farinaceous or fluid meal, leaves a degree of flatulence and distension, as intolerable as pain. Nay, in a few instances, a meat dinner has actually subdued the pain which had previously existed; but we have had reason to suspect that in these cases the pain had been more spasmodic than neuralgic.

There are extreme cases, in which the stomach is for a time the conqueror in the strife, and in which we are compelled to humour it, either by giving such thin nutriment as whey, or light curd, or isinglass dissolved in water; or by the *trimming* diet, so named by Dr. Cheyne, and strongly advocated by Dr. Todd. (*Cyc. Prac. Med.*, art. INDIGESTION.) Our embarrassment is often increased by the fickle vacillating conduct of the patient, who flies from one article of food to another without duly ascertaining their comparative fitness, vainly hoping that every change will discover something better adapted to his case than the last. And thus after making an infinity of trials, his experience is good for nothing, for not one of them has been properly conducted. We must instruct him to persevere with the kind of food which we judge most suitable, in spite of the uneasiness which it may at first occasion, because into a stomach so irritable nothing probably could be introduced which would not affect it painfully. Should it, after repeated and properly conducted trials, still produce the same effect, we must abandon it for another.

The same remark applies to the medicines which we administer, and even those of a sedative kind. Their first contact with the stomach is often painful, and this effect we must remember may depend as much on the menstruum as on the principal ingredient. The very temperature is of importance. Not long ago we had a patient who suffered intense pain in the epigastrium, followed by spasms in the extremities if he took his medicine cold. This case was an extreme one; his irritability arrived at such a pitch that the least disturbance of his system, the most trivial change of diet or medicine, the slightest shock of surprise and vexation, would induce the gastric anguish conjoined with palpitation, a state of mental agitation almost amounting to delirium, cramps in the legs, and violent priapism. His sufferings at times were such, that he felt a strong inclination to suicide.

3. We have already hinted at the difficulty of pursuing the third indication on account of the morbid sensibility of the stomach. Tonic medicines and a bracing diet are strongly indicated by the general habit; but it is clear, from

what has been said, that great caution must be exercised in employing them. By attempting too much at first we shall not only be foiled in our purpose, but the patient's confidence will be lost, which in diseases of this character it is most important to possess to an unlimited degree. We may prepare the way for more decided corroborants by enforcing attention to a variety of little details in the general management, all more or less conducive to the desired result. Thus we must recommend the selection of well-ventilated chambers, and see that the patient sleeps on a hair mattress, that he is frequently in the open air, that he takes regular exercise, observes early hours, avoids tea, coffee, tobacco, or other debilitants of the nervous system; that his room is well lighted, and that he has cheerful society. He must be sprinkled with tepid or cold water every morning, and by degrees be brought to the shower bath. If left to his own devices he will recline on a bed of down; curtains and blinds will be drawn to exclude the light, and every avenue of sound from without will be stuffed up; he will refuse to go abroad from fear of incurring some painful impression, and for the same reason will withdraw himself from all society, even of his own family. By such means he will infallibly multiply his morbid sensibility a hundred-fold. His general habit will pass into a state similar to that of one of the organs of sense which has been long deprived of the usual stimuli by mechanical obstruction, the removal of which soon informs the subject how sensibility is sharpened by disuse. To counteract such inclinations will require on the part of the practitioner no little firmness, conjoined with persuasiveness, vigilance, and patience, as well as that quality which perhaps is *instar omnium*, viz. *tact*.

GASTRORRHŒA.

Symptoms.—Causes.—Nature.—Treatment.

THIS term has been applied by French writers to cases in which large quantities of mucus are secreted by the stomach, without any inflammation of its lining membrane. We shall use it, however, in a wider sense, to include all those cases of functional disorder of the stomach, in which ejection of fluid by vomiting or eructation is the predominant symptom. It is needless to remind the reader that gastrorrhœa is often entirely secondary to, or a mere attendant upon, the diseases which we have already considered.

The fluid most commonly ejected is thin, glairy, insipid, and very like saliva; in other cases it has more of the properties of mucus: it is nearly always alkaline. The quantity thrown off varies from an ounce or two, to a pint, and upwards. When pain or a burning sensation precedes the discharge, it is called pyrosis, popularly water-brash. In some districts from its frequent association with flatulence it is called " the wind and water."

The affection generally occurs early in the morning, and at other times when the stomach is empty. Persons are most subject to it after puberty. In females we have known it as an accompaniment of pregnancy. The cause which more than all others induces the disease is the exclusive use of farinaceous and vegetable food, especially when combined with alcoholic drinks. Hence its frequency in Scotland and Ireland, where oatmeal and whiskey, or potatoes and the same liquid, are the meat and drink of a large portion of the poorer classes of the population.

Nature. Gastrorrhœa is a catarrh from the mucous membrane of the stomach, bearing the same relation to this organ as mucous and serous diarrhœa to the intestines, pituitous catarrh to the bronchial membrane, leucorrhœa to the vagina and uterus, &c. The precise pathological condition of the secreting

parts is not better known, than that of the parotids in the chronic salivation of hysteria and pregnancy, or of the kidneys in diabetes.

Treatment. The diet must be firm, dry, and compendious; containing a large proportion of animal food. The various stomachic remedies adverted to in previous sections may be useful, such as rhubarb, the vegetable bitters, and carminatives. Sedatives must often be administered on account of the accompanying gastralgia. Nitrate of bismuth has long enjoyed a high reputation as a specific. It is a valuable resource; so also is nitric acid combined with Inf. Calumb. or Inf. Lupul. with T. Cardam. Co. But the medicine which, in our hands, has been most successful, is nitrate of silver in doses of a grain twice or thrice a day. We can also bear testimony to the value of the Tinct. Benz. Co., which was a favourite remedy of Dr. Baillie. Bismuth may be given in conjunction with morphia and rhubarb powder. Some authors speak highly of sulphuret of potass, but we have no experience of its virtues.

The use of these gastric remedies must be preceded by warm purgatives, diligently followed up, until the evacuations have assumed a healthy appearance. On this subject Dr. Barlow of Bath has some excellent practical remarks in his essay upon Gastrodynia (*Cyc. Prac. Med.*), in the pathology of which disease he is of opinion, that excessive secretion of mucus forms a very prominent part. His observations apply particularly, in our judgment, to cases presenting the very common complication of gastralgia with gastrorrhœa.

INFLAMMATION OF THE DUODENUM, OR DUODENITIS.

Acute.—Chronic.—Duodenal dyspepsia.—Structural diseases of the duodenum.—Treatment of duodenal diseases.

The *anatomical characters* of this disease differ so little from those of inflammation of the stomach and of the ileum, that it would be a waste of time to dwell upon them here. We shall only remark that the elevated patches which occur, both in the acute and chronic forms, are caused by turgescence or hypertrophy of the *glandulæ conglomeratæ Brunneri*, which abound in this division of the intestine. We distinguish them from the true glands of *Peyer*, which are confined to the lower part of the canal, by their irregular form, while that of *Peyer's* glands is elliptical.

1. *Acute duodenitis.* The *symptoms* are by no means so characteristic as to enable us to recognise this form with certainty; and it may be doubted, whether *acute* inflammation is ever confined to the duodenum. We may suspect its coexistence with gastritis, when there are signs of bilious obstruction in the skin and the excretions. The jaundice, met with occasionally in gastro-enteric fevers, is connected with inflammation of the duodenum. But the exact mode of the connection has not been thoroughly ascertained. Sometimes the bile duct is obstructed by the swollen state of the membrane, or by the accumulation of viscid mucus. In other cases, the inflammation appears to have extended along the lining membrane of the duct. In many, neither obstruction nor inflammation can be detected in any part of the tubes; and then the jaundice mnst be referred to a sympathetic congestion of the liver. It is true, that congestion and inflammation of the liver may exist without jaundice; but the liver is an organ so complex that it is easy to conceive that one sort of congestion may alter the secretion very materially, though another does not. Thus, the sympathetic irritation alluded to might, upon analogy, be expected to increase the determination to the extreme branches of the vena portæ, and consequently to induce an excessive secretion of bile, which, if not removed with proportionate activity by the excretory ducts, enters into the general circulation and tinges the skin;

for, in many of the cases in which yellowness of the skin supervenes on fever, the stools are perfectly bilious.

2. *Chronic duodenitis* is more frequent than the acute form. It may be an accompaniment or a consequence of chronic gastritis. The diagnosis of the complaint is difficult, on account of the functional connection of the organ with the stomach, liver, and pancreas, and from its contiguity to the colon. We have reason, however, to suspect that it is the seat of disease, when pain is not felt till two or three hours after a meal, or when it is continued beyond this time (as in the complication of duodenal with gastric inflammation); when there is also pain in the right hypochondrium and the right scapula; when the stools are crude, fœtid, pale, or of a dark-green hue; when the skin is yellowish or muddy, and the urine dark coloured or of a dull orange hue. These symptoms, it is true, belong also to chronic hepatitis; but we may, perhaps, distinguish them from the latter by the seat of tenderness, which is referred to the space between the hypochondrium and the mesial line. An enlarged liver might cause tenderness in the same situation, but then it would be perceptible to touch and percussion. Cases, in which duodenal disease is suspected, should be examined when the stomach is empty, and after a free evacuation of the colon.

The sympathetic derangements in duodenal are scarcely less extensive than in gastric disease. The heart, however, is less frequently affected. Headach is a very common attendant, but instead of occupying the whole superciliary ridge it is more frequently confined to one side of the forehead, or even the parietal region. Pains in the back, sensations of numbness in the side, or of weakness in the lower extremities, sometimes simulating paraplegia, or partial hemiplegia, are oftener met with than in gastric cases. The cutaneous accompaniments are various forms of Ephelis, Acne, Herpes, and Pityriasis: in our experience, the two first of these have been most common.

The follicles of the duodenum are, in many cases, the principal seat of disorder; which is evidenced by discharges of mucous substance varying in tenacity from the consistence of jelly to that of concrete albumen. Such matters may, it is true, be derived from the follicles of other portions of the tube, but they are referred to the duodenum when they concur with other signs of disorder of this organ. The accumulation of the glutinous secretion may give rise to attacks of severe pain almost amounting to that occasioned by gall-stones. Such seizures are generally followed by jaundice.

3. *Duodenal dyspepsia*. There is a state of the duodenum corresponding to that which in the stomach produces dyspepsia, without any inflammation or structural alteration. It is called *bilious dyspepsia*, by Dr. W. Philip, *duodenal dyspepsia*, by Dr. Todd, and it answers to what is so often spoken of under the terms bilious disorder, hepatic derangement, chylopoietic disorder, liver disease, &c. The functional symptoms are the same as in inflammation of the viscus; but the disease is judged to be functional only, when the tongue is pale, though coated, the duodenal region not tender on pressure, the skin relaxed and moist rather than harsh and furfuraceous, and the body not emaciated.

The duodenum becomes diseased under agencies similar to those which affect the stomach. The more special exciting causes are substances passing undigested from the stomach, and irritating, or even accumulating in the duodenum. Such are fruits, crude vegetables, the harder animal substances, particularly salted meats, the tegument of fish, &c.

4. The *structural diseases* of the duodenum most frequently met with are ulceration and carcinoma; but their diagnosis, from similar disease of the stomach, liver, and pancreas, is all but impracticable.

The *treatment* of duodenal disorders must be conducted upon the same general principles as that of the gastric; but the evacuation of the bowels and the quality of the secretion will demand more particular attention. It is a great object to choose aperients which do not confine their operation to the great intestine; senna, sulphur, castor oil, and the neutral salts, are the most eligible.

They may be combined with bitter infusions, according to circumstances. Alterative doses of blue pill, Hydr. c. Cretâ, and compound calomel pill combined with henbane, or Dover's powder, are particularly useful. But it is judiciously observed by Dr. Todd, that the common practice of exhibiting at the onset a mercurial, and then an aperient, is not the most successful. The alterative agency has a much better chance of attaining its object when accumulations have been previously removed. We can speak highly of very small doses; for instance, half a grain of blue pill every night, continued for a considerable time. When there is an objection to mercurials, as in strumous subjects, we have found the combination of nitre in small doses, as recommended by Dr. Philip, with extract of taraxacum, an excellent substitute.—(℞. Pot. Nit. gr. v, Extr. Tarax. gr. xv, Inf. Rhei, ℥ x, Tr. Lav. Co., Sp. Amm. Co. â a ʒss, Tr. Hyos. ♏ xv. M.)

When no inflammation is present we have found the croton oil, *in very minute doses*, a most valuable resource, both as an aperient and in procuring bilious secretions. When there is reason to suspect that the duodenum is clogged with mucus, from a depraved condition of the follicles, the best remedy is lime water. We have known the most obstinate jaundice removed by this medicine in conjunction with minute doses of croton oil.

The use of warm baths, friction of the abdomen, and exercise, especially on horseback, are useful adjuvants. The tepid shower bath may be employed to remove some of the secondary ailments, but the nitro-muriatic pediluvium, so much extolled by some practitioners, is at best an uncertain help.

A timely application to the mineral waters of Cheltenham, Harrowgate, Marienbad, and Carlsbad, will save much medicinal treatment in all cases: even the more obstinate may yield to these, when artificial mineral waters have been altogether fruitless. The change of air, fresh scenes, and occupations, involved in excursions to the above places, may doubtless contribute to the beneficial result; but it is a great mistake, proceeding from inaccurate observation of the influence of mineral waters, to assign the good which they effect to collateral circumstances.

Defective digestion in the duodenum has often appeared to bear the relation of cause to the obstructions of the cæcum and colon so common in young females, and through this medium also to be connected with suppression or deficiency of the catamenia. And when we consider that chylifaction begins in this viscus, it is obvious how prejudicial an influence its diseases must exert upon the nutrition of the whole body. The deterioration of the blood shows itself in the tuberculous cachexia, consequent upon duodenal dyspepsy, even in subjects not predisposed to it by inheritance; but still more frequent and deadly is the relation between this disease and the tuberculous formations incident to hereditary struma.

ILEO-COLITIS, OR ENTERITIS.

General observations.—Anatomical characters.—Symptoms.—Acute or subacute.—Diagnosis from typhoid fever.—Chronic.—Causes.—Treatment.—Acute.—Chronic.

The *jejunum* is not, as far as we know, liable to primary disease, and even enjoys a singular degree of immunity from secondary complications. We shall treat of inflammation of the ileum and colon under one head, because inflammation rarely attacks the former, without extending to the latter, though the converse is not equally true. Ileo-colitis corresponds to the enteritis or muco-enteritis of many authors.

This disease is extremely various in its intensity; in some instances so

slight as to pass under the name of diarrhœa; in others, threatening the most serious disorganisation in the intestine, as well as attended with general symptoms of great severity. This difference in degree is, in the acute disease, generally connected with the kind of inflammation, whether common or specific; and this again has reference to the part of the tissue affected. It will be seen that the morbid appearances are distinguishable into two species; the one belonging to the villous coat, the other to the follicles. Simple inflammation, or that dependent on the common causes of disease, such as exposure to cold or humidity, suppression of perspiration, irregularities of diet, &c. attacks the membrane generally, while the *specific* inflammation excited by poisons introduced into the system, whether by contagion, or an atmosphere vitiated by malaria, or by human miasma, appears to engage the follicles in preference. Were it possible to inspect the mucous lining of the intestine at the commencement, and during the course of exanthematous and other specific fevers, we entertain little doubt that the attendant enteric inflammation would present appearances not less distinct than those which in the skin respectively characterise rubeola, scarlatina, variola, varicella, &c. and dependent on the particular class of follicles, or other components of the mucous tissue, which are especially affected by the morbific cause. But as the characteristic forms of the eruptions fade or become confused after death, unless vesicles or pustules have been formed, so we fail to discover on the mucous surface analogous peculiarities, unless the follicles have undergone alteration. But even as it regards these, much remains to be investigated; for although it has been ascertained that a certain change in Peyer's glands belongs to one form of typhoid fever, and another change to tuberculous phthisis, we have yet to discover what are the forms of fever in which the other sets of follicles are more particularly engaged, or in which the follicles escape disease altogether, the inflammation or congestion having been of that kind which corresponds to the papular or to the diffuse forms of cutaneous eruptions.

Anatomical characters of acute Ileo-colitis. The remarks already offered on the general appearances of gastro-enteric inflammation, need not now be repeated. The peculiarities observed in this tract of the canal under present consideration have reference to the form of certain elevated patches, and of the ulcerations. The forms met with in the ileum are oval, and circular; in the colon, circular only. These differences are caused by the parts affected. The isolated follicles found both in the ileum and colon, when turgid from inflammation or its products, present a button-like pustular appearance; but the agminated glands of *Peyer* which are confined to the ileum, have an elliptical arrangement, which becomes very manifest in their distended or eroded condition. In some cases the isolated glands are extensively affected, while the agminated altogether escape, and *vice versâ.* If the disease is intense, the ulcerative process extends to the adjoining mucous membrane, the destruction of which causes the separate follicular ulcers to coalesce, and in this way the forms may appear extremely irregular. Inflammation of the villous membrane, independently of the follicles, is betokened by mere redness, softening, irregular abrasions, hypertrophy, flakes of coagulable lymph, and hæmorrhagic infiltration. In some rare cases, a uniform blackness, the effect of gangrene, is observed. The membranous kind of inflammation, as distinguished from the follicular, is more frequently observed in the colon.

The acute follicular inflammation constitutes the dothinenteritis of M. Bretonneau, and the *exanthême interne* of Andral and others. There is great reason to believe that it is of a specific nature, and that it occurs only in fevers. Certainly the limitation of the disease to the elliptic patches of Peyer, is observed in no other acute malady than typhoid fever, and it is remarkable that, according to M. Louis, it never occurs after the age of fifty. The particular changes which these glands undergo, such as the formation of a white deposit under the mucous membrane, the gradual destruction of this matter, and of the membrane itself, are treated of under the pathology of fever. M. M. Louis

and Chomel consider it a constant lesion in typhoid fever, but though an occasional complication of fever of this country it is by no means invariably present.

We have rarely had an opportunity of witnessing the appearances of acute ileo-colitis, except as complicated with the follicular inflammation of typhus, or as secondary to disease in some other organs. In its simple form the disease is very seldom fatal.

The appearances in acute *colitis*, or dysentery, are patches of redness, with coatings of lymph, tough mucus, or pus, minute or wide—spreading irregular ulcerations, intersected by stripes of mucous membrane, which have escaped erosion, and thickening of the membrane amounting sometimes to fungous vegetations. In some rare cases the membrane has been covered with minute vesicles, on the surface of which there were flakes of fibrinous matter. The vesicles may have been minute follicles in a state of turgescence.

2. In *chronic* ileo-colitis, besides the softening, thickening, and ulceration which it exhibits in common with the acute form, we find induration, and the brown and slate-coloured tints. The latter are not unfrequently the only morbid appearances, or are combined with a slight thickening of the membrane. The brown hue mnst not be confounded with the stain of feculent matter. The slate colour often passes into black, and then resembles melanosis; it is generally distributed in dots, or in very fine reticulated striæ. In severe cases of long standing, the whole calibre of the large intestine has been found contracted by the inward growth of the hypertrophied mucous membrane.

Chronic ulceration confined to the glands of Peyer, occurs only in tuberculous cases. In other cases the isolated follicles in the ileum, as well as in the colon, may undergo similar changes; but the latter is by far the most frequent seat of such disease.

The depth to which ulceration extends, both in the acute and chronic cases, is various. In some, we observe only a small opening in the centre of a furuncular excrescence; in this form, the principal lesion is the distension of the follicle itself with the morbid deposit or secretion; and the ulceration has but just commenced around the mouth of the excretory duct. We have never observed it, but in cases of fever. In one remarkable instance, we found the cæcum and ascending colon, and a part of the arch, thickly studded with these excrescences, each having the size and form of the head of a brass nail; while the glands of Peyer in the ileum were proportionally congested, but had scarcely ulcerated. In other instances, the mucous membrane over the whole surface of the follicle, is destroyed; in others the glandular structure itself is destroyed, and the base of the ulcer is either cellular membrane, or the muscular coat; the edges being red or pale, and either hardened as in chancre, or flat and soft. 'Sometimes nothing but peritoneum is left at the base, the destruction of which by gangrene, or rupture, is the cause of the intestinal perforation which occasionally supervenes. The glands of the lower end of the ileum, both single and agminated, present the deepest ulcerations, and consequently are the most frequent, if not the only seat of the accident alluded to. (See Peritonitis by Perforation.) In nearly all cases of follicular enteritis, the lymphatic glands of the mesentery are swollen, and of a crimson or vermilion hue. Hence the fever in which such lesions occur was called by M. Petit, *entero-mesenteric fever.*

1. *Symptoms of acute and sub-acute ileo-colitis.* The most usual *local* symptoms are pain of a dull or griping character about the hypogastrium, and right iliac region, tenderness on pressure, and diarrhœa; the stools being of a thin, feculent character, sometimes mixed with mucus. Considerable heat, and sometimes a gurgling sensation, in the situation of the ileo-cæcal valve, may be felt when the hand is applied to the abdomen. Meteorism is not common in the idiopathic form of the disease.

There is generally fever, the skin however being often moist, and the pulse soft; the urine is scanty and high-coloured; the tongue often red at the tip and

edges, and furred in the centre; though this appearance is by no means so constant as it was once thought to be. In severe cases, the crust becomes brown, or even black, the cheeks have a fixed red flush, and the eyes are dull; occasionally there is delirium succeeded by stupor; and in some cases, especially in the typhoid form, the cerebral symptoms entirely obscure the abdominal affection. It may be in many instances questionable, whether the symptoms belong to simple enteritis or to typhoid fever. The following table abridged from a summary of seventeen cases of typhoid affection, and twenty-three of enteritis, observed by M. Louis, gives a good idea of the diagnostic characters. (*Examen de l'Examen de M. Broussais*, p. 104.).

Typhoid Affection.	*Enteritis.*
Diarrhœa, in 14 cases out of 15.	In all the cases.
Abdominal pain in 8 out of 11.	In 22 out of 23.
Meteorism in 12 out of 17.	In 1 only of the 23.
Enlargement of the spleen in 11 out of 15.	In none.
Epigastrium painful in 1.	Indolent.
Nausea in 1 case (in the erect posture).	In 2 cases the first and sixth day.
Anorexia in all.	In 5 out of 23.
Tongue thick and red in 3 cases, from the fifth and sixth day; dry and red in 2 others; dry and black in 1.	Sometimes whitish, without any other lesion.
Fauces, inflamed in several.	Healthy.
Headach in all,	In 1 slight.
Somnolence in 5.	In none.
Weakness remarkable.	Slight.
Dazzling sensations in 6.	None.
Noises in the ears.	None.
Deafness in 3.	None.
Vision disturbed in 7.	Healthy.
Epistaxis in seven tenths of the cases.	None.
Rose coloured lenticular spots in 15 out of 16.	None.
Heat excessive in all.	Slight in 4.
Pulse above 100 in 7 cases.	80 in 3, and from 70 to 50 in the rest.
Duration — 25 days average.	3 to 4 days.
Mortality — one fifth.	None.
Age — average twenty-two and a half.	36.
Treatment. — One or two bleedings of 10 to 15 oz.; Syrup mucilage, Seltzer Water, and Linseed Enemata.	A quarter-lavement of Linseed and Opium; Rice Water: no bleeding except in one case, complicated with pneumonia.

It appears, therefore, that the typhoid affection differs not only in the kind and degree, but still more remarkably in the number of the symptoms. When in addition to these symptoms, we bear in mind that in the typhoid affection the glands of Peyer are specifically diseased, and very often without any inflammation of the surrounding membrane, while in enteritis, the inflammation is more membranous than follicular (the glands of Peyer partaking only secondarily of the inflammation which surrounds them), the distinction in the nature of the two diseases is still more decided.

The above analysis shows how mild were the cases of enteritis; not only by the recovery of the patients, but also by the success of the very gentle treatment. The disease would probably have been called in this country diarrhœa: indeed the ileo-colitis, under consideration, might not inappropriately be designated inflammatory diarrhœa. In many instances, it is probable that the congested state of the mucous membrane is so speedily relieved by the serous and mucous secretions, that true inflammation is not established. The unfavourable cases which have fallen under our notice have been generally complicated with pneumonic, bronchitic, or phthisical disease.

2. In *chronic ileo-colitis*, diarrhœa is the most prominent and constant symptom. The disease is often complicated with other maladies of long standing, particularly phthisis and carcinoma of the pelvic organs. But it may be simple, and have come on gradually, or supervened upon an acute seizure. The duration of the disease is indefinite, the symptoms continuing in a slight degree, but subject to transient aggravations, or occurring after periods of apparently complete health. In most cases there is a gradual loss of flesh; and, as the disease advances, hectic fever. The stools consist of thin feculent matter, or of small

scybala mixed with sero-mucous or muco-purulent discharges. Sometimes there is bloody or sanious fluid.

It often happens, both in the acute and chronic ileo-colitis, that a certain degree of inflammation coexists in the stomach. The disease is then called *gastro-enteritis*, and we recognise it by nausea, vomiting, and heat, with pain and tenderness of the epigastrium, in addition to the other symptoms. The febrile action is in such cases more intense than in the simple ileo-colitis, the brain more disturbed, and the tongue, in the acute form, more reddened and papillated; in the chronic, more rough and fissured.

Causes. The most frequent cause is a cold and damp air, or an epidemic condition of the atmosphere, known only by its effect. The latter is often observed to prevail in the autumn; and in some countries, especially within the tropics, the disease may be traced to malaria. Wet feet often induce an attack. Some articles of food produce the same effect; such are unripe fruits, certain vegetables, and salt provisions. Excess in quantity may sometimes be charged with the evil, though not unfrequently it may be traced to want of food; a fact which should warn us not to push abstinence too far in the treatment.

Treatment of acute ileo-colitis. In mild cases, the application of a few leeches to the abdomen, fomentations, mucilaginous drinks, and small doses of Dover's powder with Hydr. c. Cret., or rhubarb, according to circumstances, comprehend all that is necessary to be done. In severer cases, especially if the subject is plethoric, a general bleeding will expedite the cure; and a second or third application of leeches may be needful. We attach great efficacy to leeches applied to the anus, and believe that a smaller amount of blood is required when taken from this situation, in consequence of the more powerful derivation thus effected. When the stomach is irritable, we may substitute opiate enemata for the Dover's powder. But we must not be in haste to check the diarrhœa, except by means calculated at the same time to arrest the inflammation. The untimely use of astringents has often, by suppressing the secretion, aggravated the disease in the mucous capillaries. The warm bath is a useful adjuvant. The diet must consist of bland farinaceous substances, particularly rice and arrowroot.

When the diarrhœa continues troublesome, notwithstanding the inflammatory symptoms have abated, (a state of things indicated by a diminution of mucus in the stools,) the chalk julep with a little vin. ipecac. may be given.

In the treatment of the *chronic* form we must have recourse to frequent local depletion, unless the case is far advanced; and this may alternate with, or be assiduously followed up by counter-irritation, the most eligible form of which is repeated blistering. A mild mercurial course, sufficient to affect the gums, has often proved highly beneficial; but it is not desirable to attempt this treatment if we believe that chronic ulceration has taken place to any great extent.

In cases of long standing the diarrhœa is the grand evil, for the removal of which the patient is most anxious. But in these as well as in the acute form, it is not a matter of indifference by what means the desired end is accomplished. If suddenly effected by astringents, the patient complains of fever, headach, and pain in the abdomen; but this seldom happens, if a few leeches and a blister have been previously applied.

The medicines which exercise most control over chronic diarrhœa, are Opium, Logwood, Catechu, Kino, Compound Tinct. of Benzoin, Cupri Sulphas, Plumbi Acetas, and Zinci Sulphas. They require frequent variation in their forms and combinations; and we must bear in mind the necessity of husbanding our resources, that is, of not using stronger means than are just sufficient to produce the effect at the time. For in the earlier stages, a single vegetable astringent, with cretaceous mixture, may do as much as in the more advanced periods can only be achieved by the most powerful combinations of metallic substances. Dover's powder, the Pulv. Cret. Comp. c̄. Op., the Pulv. Kino Comp., are excellent medicines in any stage.

When there has been reason to suspect ulceration low down in the colon

and rectum, which is indicated by hasty impetuous evacuations, and a feeling of pain or irritation in the part, we have used an enema of from 5 to 10 gr. of nitrate of silver in 4 oz. of water, followed soon after by an emollient or opiate injection. Suppositories of opium are often retained, when enemata have been rejected.

The strength of the patient often requires to be supported by preparations of bark, iron, and zinc; and by wine, particularly old port. Pills containing one or two grains of quinine and half a grain of opium, with Ext. Gentian, have sometimes acted beneficially, not only by imparting vigour and improving the appetite, but also as astringents, even when other medicines of this class had been useless. The muriated tincture of iron is perhaps the best preparation of the metal that can be employed in this disease.

The food should be as nutritious as possible, consistently with the avoidance of irritation. The farinacea and plain tender meat are the best articles. In many cases an exclusively milk diet is well borne, and is sufficiently restorative. Patients will soon be convinced, in opposition to their preconceptions, that they have a better chance of regaining flesh and strength under a diet judiciously limited in quantity as well as in kind, than under the systems of promiscuous and unbounded feeding, suggested by their short-sighted friends and relatives. Warm baths, warm clothing, particularly of the feet, and a swathe of flannel round the abdomen, are means not a little conducive to recovery.

COLITIS, OR DYSENTERY.

Symptoms of acute colitis.—Local.—General.—Of chronic colitis.—Diagnosis.—Prognosis.— Causes.— Treatment.

The anatomical characters of this disease having been described in the foregoing chapter, we shall enter at once upon the history of its symptoms.

Symptoms of Acute Colitis. Uneasiness of the abdomen, soon amounting to pain of a griping character, particularly in the umbilical region (tormina), attended with an inclination to go to stool, and temporarily relieved by the evacuation, is, in most cases, one of the earliest local symptoms. Occasionally the inclination does not differ at first from what occurs in simple diarrhœa, and the evacuations discharged are feculent. As the disease becomes developed, the relief is but transient; the desire to go to stool is more frequent and importunate; the secretions are thin, mucous, and sanguinolent, mixed with nodules of scybalous matter; the blood is sometimes florid and pure, more frequently interspersed with shreds of mucus or albumen; sometimes it is only sufficient to give a dirty red tint to the rest of the fluid, and then it has been compared to water in which flesh has been macerated. The scanty evacuations now produce distress rather than ease, and the patient fancies that there is still something that should come away, and the expulsion of which would cure him, just as persons suffering long from nausea and vomiting, have a strong, but false conviction, that food still remains in the stomach, and beg for emetics. If the disease is not checked, the tenesmus and griping increase, and the abdomen becomes hot and tender. In an advanced stage the stools are fœtid and dark-coloured, and contain lumps of a whitish, pultaceous, or semipurulent character. The bladder, in severe cases, painfully sympathises with the rectum, and hence the dysuria which occasionally attends the disease.

Among the *general* symptoms we must first take notice of the fever. This in the sporadic form of dysentery, is usually symptomatic only, and often delays its appearance till the local affection has assumed a considerable intensity; but in other cases the disease sets in with rigors, *malaise*, and the ordinary

precursors of a febrile attack. The tongue is furred, and in bad cases covered with a dark crust, the fissures of which show a dull crimson hue beneath; the lips are often dry and cracked, and the countenance, as in nearly all abdominal maladies, indicates great depression.

We do not consider it worth while to describe, or even to enumerate, the various divisions of this disease, which authors have delighted to multiply. Like every other inflammation, particularly of the mucous tissue, it will take its complexion from the physical constitution of the race, whether xanthous or dark-coloured; from the state of the system, as affected by climate, and by epidemic or endemic conditions of the atmosphere; from the individual temperament or habit, as inherited or acquired; from the general pathological states accompanying or following other maladies, such as hepatic and splenic diseases, scorbutus, &c. from the disease of which it may be but a complication, as typhoid fever, remittent fever, or rheumatism; and lastly, from the specific nature of the exciting cause, as malaria or contagion. To follow some authors through the varieties which they describe, would be nearly equivalent to studying all the diseases in the course of which the great intestine may become inflamed.

The severity and danger of the disease are co-extensive with the tract of intestine involved. In the milder form, there is reason to believe, though we have not absolute proof of it by *post mortem* observations, that the lower part only of the colon, and perhaps the rectum, are affected, and in such cases the symptoms are almost entirely local. We have, however, not unfrequently met with cases in which there was little general disorder, and the stools were neither very frequent nor very distressing, though quite characteristic, but in which there has been griping about the umbilicus, and a dull tenderness in that region on pressure. In such forms of disease the character of the inflammation is passive, and the subjects of it have generally a languid circulation. With this exception, our experience fully accords with the following judicious observations of Dr. Abercrombie:—

"While it is limited to a defined portion of the lower part of the intestine, it may be a disease of little danger; but it is to be kept in mind, that its danger is generally in proportion to its extent. If it be attended with pain and tenderness extending above the pubes, and along the course of the descending colon, the case is becoming more precarious. If there be tenderness and tension extending along the epigastric region, so as to give reason to apprehend that the arch of the colon is involved in the disease, the case is more and more alarming; when there is reason to fear that it affects the whole course of the great intestine, the danger is extreme. There is generally, in this case, much constitutional disturbance, with quick pulse, thirst, anxiety, vomiting, hiccup, and rapid failing of the vital powers; the evacuations from the bowels vary in the manner which has been already referred to; being either mucous, watery, or feculent, or consisting of various combinations of these matters with each other." (*Dis. of the Stomach*, p. 220.)

The formidable cases alluded to in the latter part of this extract, occur chiefly within the tropics; but they may be witnessed in our own climate, when there has been a concurrence of atmospheric and other causes to be mentioned presently.

Chronic Colitis. The symptoms of chronic dysentery differ so little from those described under chronic ileo-colitis, that we deem it needless to recount them here. We shall only add that the chronic form generally supervenes on the acute; that the fever is absent, or assumes, in an advanced period of the disease, a hectic type, and that the stools are more frequently sanguinolent and sanious than in ileo-colitis. Hepatic abscess has been often observed in connection with the intestinal ulcerations of chronic dysentery; but whether this is caused by inflammation of the veins, or by the admixture of pus with the blood contained within them, or simply by that sympathy which exists between organs connected both by function and by contiguity, it is not easy to determine. The

latter explanation, together with the peculiar nature of the portal circulation, would account for the converse influence of hepatic disease on dysentery.

Diagnosis. It is not easy to confound dysentery with any other disease. It is true that not always presenting at the commencement the peculiar stools or the tenesmus, it may be taken for simple diarrhœa; but the inflammatory symptoms which accompany it will show its cause and seat; so that in a practical point of view, it is of little importance whether we call the disease inflammatory diarrhœa, ileo-colitis, or dysenteric colitis. The milder cases of dysentery (which might be termed ortho-colitis), derive their character, as we have seen, from the parts affected, and cannot be confounded with ileo-colitis; but the severer form, differing so little from the latter in its seat, and at first in the kind of dejections, is distinguishable in its progress by the intensity of the inflammation, and by the peculiarity of its products.

Cholera, in its indigenous form, is distinguished by the bilious vomiting and diarrhœa, and the spasms of the extremities; in the Asiatic form it is so unlike, that it would require some ingenuity to say in what way it could be mistaken for dysentery. Yet in the fever consecutive to this form of cholera, we have known dysentery occur as a complication.

Hæmorrhoids by giving rise to tenesmus and bloody discharge, may simulate dysentery; nay, the inflammation which sometimes accompanies them may by extension pass into dysentery; but when not so complicated, they are to be distinguished by the hæmorrhoidal tumours, the pure florid blood, the sero-mucous exudation, and the pain felt at the termination of the rectum during a stool.

Prognosis. We have already noticed the indications of severity afforded by the pathological extent of the disease, but other signs may be derived from the symptoms and their duration. When the stools, after having been mucous and bloody, become bilious and feculent, and the tormina and tenesmus abate, we may augur favourably of the issue of an acute attack, bearing in mind, however, that the disease, may pass from this state into chronic dysentery.

The following is a summary of the more striking *signa infausta.* A tumid, tense, and tender abdomen, the skin dry, harsh, unequally warm or moistened with cold perspiration, and of a lurid hue —the finger-nails sub-livid, the position of the body supine, with the knees drawn up, the eyes sunk, cheeks collapsed, the mouth half open, the teeth covered with sordes, the tongue red and polished or looking chapped and raw; the prostration extreme, the dejections involuntary, and sanious or claret coloured, with an odour *sui generis* — the urine scanty and copper coloured; the pulse rapid, small and weak—muttering delirium, stupor and subsultus tendinum. We have known nearly all these symptoms present without any marked disturbance of the mental function, though it shared the general debility and exhaustion of the system. If no manifest improvement occurs in the local or febrile symptoms after the seventh day, the case may be viewed seriously; and if they continue unabated to the fourteenth or seventeenth, great danger is to be apprehended. The fever, whether typhoid or inflammatory, the subject, the nature of the cause, the character of the epidemic, and its tolerance of active remedies, will greatly influence the prognosis.

Causes. Dysentery spares neither age nor sex; but the persons most liable to it are such as have their vital powers depressed by fatigue, watching, anxiety, fear. The exciting causes may be such as act immediately on the alimentary canal; for example, acid unripe fruits, ill-made bread, blighted grain, drastic purgatives, putrid flesh. Of the effect of water polluted by animal matter in a state of decomposition, Dr. Copland speaks very decidedly in his copious and elaborate article, "Dysentery." He also declares that he has had repeated proofs that putrid exhalations may produce the disease. Exposure to cold and moisture, especially during the night in hot climates, is a powerful agent; hence the ravages of the disease amongst encamped armies. The contagiousness of dysentery, as of so many other diseases which prevail in an epidemic form, has been vehemently asserted and denied. The true doctrine appears to us to

be, that although not essentially contagious, that is, although dysentery may run its course in one individual, without producing any secretion or exhalation capable of communicating the disease, yet in another, subjected to peculiar circumstances, there may be such a concurrent alteration of the fluids of the body, as will generate a contagious matter. This is particularly the case when the local inflammation is complicated with typhoid fever; as may be witnessed in crowded prisons and camps, or among persons predisposed by their privations, habits, unwholesome dwellings, and accumulated effluvia, to this form of the disease. In some countries, in Egypt for instance where it is endemic, and in Maryland, it may be traced to malaria. In the former it alternates with ophthalmia. In the Peninsula it was observed among our armies to assume a remittent type, or rather to be complicated with a remittent fever, an indirect evidence of its malarious origin. Dr. Copland observed a similar relation in Africa. The prevalence of the disease in tropical climates is well known; hot seasons, and particularly sultry days succeeded by cold damp nights, exert a remarkable agency in its production. Thus out of 13,900 dysenteric cases in Bengal, from 1820 to 1825, Mr. Annesley found that while 2400 only occurred in the cold season, there were 4500 in the hot and dry, and 7000 in the hot and humid season. In equatorial countries, dysentery is much more frequently connected with hepatic disease than in the temperate zone.

Treatment. In the simple forms of the disease the indications are obvious, and not difficult to accomplish: 1. to reduce the local inflammation; and, 2. to alleviate the more distressing symptoms.

1. Bloodletting, both by the lancet and by leeches must be practised, unless there are strong contra-indications in the habit of the individual. Though we have known it requisite to repeat venesection twice and thrice, one general bleeding for the most part is sufficient. Leeches are to be applied freely, in relays of from twenty to thirty, along the arch of the colon, or, with still more decided benefit, in smaller numbers around the margin of the anus. The warm fomentations and poultices applied to encourage the bleeding afford great relief. In very mild cases leeching only will suffice. Blisters may be employed when we have carried depletion as far as we think safe, but not before. Dr. O'Beirne, of Dublin, recommends with great earnestness fomentations of the abdomen with infusion of tobacco, made in the proportion of a quarter of a pound of leaf tobacco, to four or five quarts of water. Under their use the tormina abate, and the force of the circulation is reduced with less expenditure of the general strength than when bleeding only is employed.* The medicines which should be given internally, must be determined by the state of the bowels. If the attack began with feculent diarrhœa, it is useless and injurious to exhibit purgatives, though it was once the practice to employ active cathartics from the commencement, under the false impression that the irritation was caused by scybala, while on the contrary, these accumulations in the cells of the colon are the mere effect of the irregular and spasmodic contraction of its fibres; on the subsidence of which, together with the inflammation, the scybala are propelled by the more equable and consentaneous action of all the portions of the gut. But if, from the beginning, there has been a deficiency of the natural excretion, or if some time has passed during the course of the disease without a feculent motion, it is desirable to administer a laxative. It must, however, be still borne in mind that depletion is itself one of the best aperient measures, by removing the cause on which the suppression of the natural secretions depends. Castor oil alone, or in the form of emulsion, may be given, and it is an excellent practice to add to it a few drops of laudanum, which will not interfere with its aperient effect. We can recommend with confidence a compound which we are in the habit of prescribing in many cases, which demand an accommodation of the laxative to the irritable condition of the gut, consisting of manna, sulphur, carbonate of soda, and tincture of henbane. It

* New Views of Defæcation, &c. by Dr O'Beirne, &c.

may be rendered more potent by adding infusion of senna. In some cases the Pulv. Jalap Comp. answers extremely well, operating fully, and with little distress. The time for adopting this part of the treatment often presents a difficult question, to be decided by the tact and experience of the practitioner. After free depletion in proportion to the strength, if twenty-four hours have elapsed without any decided admixture of feculent matter with the discharges, we have known a dose of calomel alone produce a very happy effect, bringing down a bilious stool, from which the subsequent amendment might be dated.

Dr. O'Beirne is anxious to induce his professional brethren to make trial of the introduction of his favourite tube into the sigmoid flexure of the colon, believing that much mischief ensues from the retention of fecal matter, and diseased secretions in the large bowel; and that this retention is mainly caused by a spasmodic closure of the upper annulus of the rectum. He relates three cases in which it seemed to be beneficial.

Opium is a most important remedy, either alone, or in conjunction with mercury. The latter combination is often administered with a view to maintain the natural secretions, at the same time that it moderates the irritation. It may be given in doses of one or two grains of calomel with half a grain or a grain of opium, or five grains of Dover's powder every three hours, or if the calomel appears too irritating, Hydrar. c. Cretâ may be substituted. In tropical climates, scruple doses of calomel have sometimes appeared to allay rather than to aggravate the irritation, and we have witnessed analogous effects in this country. This observation was once greatly abused in tropical practice, having tempted practitioners to the indiscriminate and empirical employment of the medicine as a specific. Perhaps the fact of the disease being not infrequently connected with hepatic affections and bilious fevers, had an equal influence in encouraging the practice. The sedative effect alluded to, is produced rather upon the stomach (checking sickness) than upon the colon, which, on the contrary, seems to be specifically irritated by this medicine. The weight of testimony is now decidedly in opposition to its employment in large doses. Nor does so much good seem to have resulted, as might *à priori* have been expected. from mercury given in small but repeated doses, sufficient to affect the mouth. Dr. Cheyne (*Dub. Hosp. Rep.*, vol. iii.) found it useless in the epidemic dysentery which ravaged Ireland; and although he speaks favourably of calomel and opium, it is evident that he assigns the benefit chiefly to the latter medicine, which he thinks ought to be used in large doses. The co-existence of a scorbutic state of the system is a strong contra-indicant to mercury.

It is a great object to promote the action of the skin, for which purpose the warm bath may be used, conjointly with Dover's powder and saline diaphoretics. Ipecacuanha has been recommended strongly by Mr. Twining, for its somewhat specific effect in allaying irritation, and procuring natural secretions, in doses of 5 or 6 grs. combined with extract of gentian, night and morning. In co-operation with this remedy, Mr. Twining administered a drachm of Pulv. Jalap Comp. (Jalap ℈i, Pot. Supert. ℈ij) in the middle of the day. (*Clin. Illust. of the Dis. of Bengal*, vol. i. p. 69.) It is remarkable that the ipecacuanha, though in such large quantities, rarely produces sickness.

2. For the relief of the tormina and the tenesmus, opium is our great resource. Dover's powder, in full doses by the mouth, in some cases has a very happy effect. If it causes sickness, we may administer crude opium in the form of pills. Sometimes the rectum will retain a small injection of arrow-root and laudanum; and when this is the case we cannot select a better mode of using the remedy. Opiate suppositories are also useful.

A solution of acetate of lead and laudanum is sometimes a good palliative of the tenesmus, and for moderating the sanguineous discharge, no medicine is, in our opinion, comparable to the acetate of lead. But it should not be administered before depletion has been freely employed; we have ventured, however, to give it earlier than we should have dared to use any other astringent, believing that it exerts a sedative action upon inflamed parts independently of

its styptic property. It may be exhibited by the mouth, either in pills or in solution.

For restoring the natural condition of the mucous membrane, after the active inflammation has given way, we may employ lime water, copaiba, nitric acid with light bitters, conjoining opium according to circumstances.

In cases attended with great prostration from the commencement, particularly in low typhoid fever, it may be necessary, not only to use depletion sparingly, but to administer wine and ammonia early in the attack. Dr. Copland speaks highly of oil of turpentine and castor oil as a purgative in what he designates the simple asthenic form. But the modifications of treatment required in the various forms under which dysentery appears, are endless. For those which belong more particularly to tropical climates, we refer to the works of the last mentioned author, and also of Dr. James Johnson, Mr. Annesley, and Mr. Twining.

The principles of treatment appropriate to *chronic* dysentery, may be gathered from what has been said of chronic ileo-colitis. But we may remark, in addition, that Mr. Twining found ipecacuanha in large doses scarcely less useful in this than in the acute form. The chronic thickening and induration of the sigmoid flexure of the colon, sometimes left by chronic dysentery, requires a long and persevering use of local remedies, particularly leeching and repeated blistering.

The diet of dysenteric patients must be sparing and light, consisting of liquid or semi-liquid farinaceous substances, not only as a part of the antiphlogistic treatment, but to avoid any risk of topical irritation. In the chronic disease we may often allow wine, at the same time that we forbid any but the lightest aliments, such as arrow-root and milk.

INFLAMMATION OF THE CÆCUM

Occurs as a concomitant, or a consequence of the diseases described under the heads of colitis, and ileo-colitis; but occasionally, though not very frequently, inflammation attacks the mucous lining of the cœcum, without extending either to the ileum or the colon. When this happens the affection may be referred to causes of a purely local nature. Of this kind are intestinal concretions, or the accumulation of matters which have been imperfectly or not at all digested; retained and hardened fæces, the irritation of worms, &c.

The symptoms are pain and tenderness confined to the right iliac region or proceeding from it, as from a centre, and diarrhœa; the stools consisting chiefly of thin ill-concocted feculent substance, with much mucus, and occasionally of hard lumps covered with slimy matter. These may be accompanied by a dull aching sensation in the lumbar region.

The disease is not very serious if it is treated promptly. But if neglected, the inflammation may extend to the other coats of the cæcum, and thus assume a much more dangerous character.

Leeches and blisters applied to the right iliac fossa; castor oil, if there is reason to expect accumulations; lenitive electuary; large and repeated emollient enemata, are the most important items of the treatment. In administering the enemata it may be requisite to use a tube of sufficient length to enter the sigmoid flexure of the colon. In the chronic form of the disease, the balsam of copaiba, oil of turpentine, and compound tincture of benzoin are useful medicines.

Inflammation of the serous covering of the cæcum will be treated of under PERITONITIS.

sense of uneasiness at the epigastrium, with some degree of tenderness on pressure; and an irregular action of the bowels, attended with colic and copious discharges of dark, vitiated bile — symptoms indicative of gastric and intestinal irritation, which, under appropriate treatment, gradually subsides.

As sporadic cholera rarely occurs, except in autumn, and does not often prove fatal, opportunities of examining the state of the organs after death are not frequent, and the morbid anatomy of the disease has not been sufficiently studied. Since the appearance of malignant cholera, which, in many of its symptoms, offers a striking resemblance to the disease of which we are now speaking, a new interest attaches to the latter, from its bearing on the important question of the specific nature of the former. It would be especially interesting to ascertain whether the intestinal glands or follicles, which are almost constantly enlarged in malignant or Asiatic cholera, are similarly affected in sporadic.

Causes. The chief predisposing cause is season. We have already stated that the disease is most frequently met with in autumn. Sydenham says, that it occurs with the same regularity in August, as swallows in spring, or the cuckoo at the commencement of summer; and placed so much reliance on this circumstance, as to believe that a disease occurring at any other season, though resembling autumnal cholera in symptoms, is in its nature essentially different. He ascribed the production of cholera to some atmospheric influence peculiar to that season.* It has been observed to be most common in adult age. Among the occasional exciting causes may be mentioned, spoiled or unwholesome provisions; the action of an emetic, or drastic purgative; iced or cold drinks, when the body is heated; or an abrupt transition from a high to a low temperature.

Treatment. Opium was first recommended by Sydenham, and subsequent experience has justified him in calling it the sheet-anchor of the physician, in the treatment of this disease. A considerable dose of it should be given at once, and be repeated at the end of two or three hours. If this fail in putting a stop to the symptoms, we may give it in conjunction with calomel, one grain of the former, with eight or ten of the latter; which may be repeated, if necessary, after some hours. Diluent drinks should be allowed, *in small quantities*, with the view to allay thirst without exciting vomiting. The heat of the surface should be maintained by friction; by the application of bags of hot bran, salt, or sawdust; but especially by the hot air bath. We would warn our readers against the danger of applying jars of *hot* water to the feet, in cases in which these are very cold. We have recently seen a case in which such application, though scarcely noticed by the patient at the time, and producing no immediate effect on the parts, was followed, on the occurrence of reaction, by extensive vesication and mortification of the feet. This is analogous to what happens when the same treatment is adopted in cases of frost-bite. If the collapse be considerable, we may have recourse to diffusible stimuli, such as brandy, camphor, and ammonia. The diligent application of these means during the urgency of the symptoms, will rarely fail of success. After the subsidence of the violent symptoms, the strength of the patient should be recruited by a mild, nutritious diet; every thing likely to bring on a recurrence of the symptoms should be avoided; and constipation, if present, which frequently happens in these cases, should be removed by the use of emollient enemas. If symptoms of gastric irritation remain, we should prescribe leeches to the epigastrium; soda water, or effervescing draughts, in small quantities; and a diet of the mildest kind.

Malignant or Asiatic Cholera.

There is reason to believe that this pestilence existed in India, showing itself,

* Sporadic cholera does not occur exclusively in autumn, as Sydenham imagined; but it is certainly much more frequent during that season than at any other time of year.

however, only occasionally, and in districts of limited extent, for a long time before it became diffused over Asia and Europe. Dr. Paisley mentions it as being at Madras in 1774. (See *Curtis's Diseases of India.*) In 1780 it is said to have destroyed at Hurdwar, during a festival which is annually held there, 20,000 persons; and, in 1781, to have assailed, in its most malignant form, a division of Bengal troops, then stationed at Ganjam. An admirable account of the disease, which leaves no doubt of its identity with that since prevalent, was given by Mr. Curtis, who described it as spreading, in the year 1782, in Sir E. Hughes's squadron, then stationed in the East; and as having arisen from communication with an infected port in Ceylon. In the *Madras Reports*, it is stated to have raged at Arcot in 1787.

It appears from a communication made by Mr. Barnes, the medical superintendant at Jessore since the year 1810, to Dr. Roupell (see *Roupell on Cholera*, p. 16.) that twice previously to 1817, the disease had prevailed there to a great extent. In the months of May and June of the latter year, it showed itself in various parts of the southern districts of Bengal, and, in the month of August, suddenly broke out at Jessore, a populous town in the centre of the Delta of the Ganges, where, from its inexplicable and fatal effects, it occasioned the greatest consternation: six thousand persons are reported to have died of it in the course of a few weeks.

From this point, as its origin *, it spread rapidly, in every direction, over the provinces of Bengal, and, by the beginning of September, had reached Calcutta. It then followed, principally, the course of the Ganges and its tributaries, appearing successively at towns more and more remote from its mouth; and, in the beginning of November, attacked, with great virulence, the English army then assembled on the banks of the Sinde, one of the tributaries of the Jumna, in the most central part of India. In 1818, it still advanced, and, in the month of August of that year, reached the western coast of India, having traversed the Ghauts. But, while the disease was continuing its march from east to west across the peninsula of India, it proceeded, in the spring of 1818, from north to south along the coast of Coromandel, and, in the month of October of that year, appeared in the city of Madras, and had spread over that presidency; so that, by the end of 1818, it had become diffused over all the continent of India. In the beginning of 1819 it invaded the island of Ceylon; and in the month of November of the same year made its appearance in the Mauritius, where it proved very destructive.

While the disease was thus becoming disseminated throughout the peninsula of India, it extended itself, at first much more slowly, along the eastern coast of the Bay of Bengal. In 1819 it penetrated into the kingdom of Arracan, whence it passed into the kingdom of Siam, the peninsula of Malacca, and the island of Sumatra. In 1820 it appeared at Canton, in Borneo, and at Manilla, in the Phillippine Islands. In 1823, we find it committing its accustomed ravages in the Mollucca or Spice Islands, and in the Chinese cities of Nankin and Pekin, It subsequently penetrated into Chinese Tartary, and the high latitudes of Eastern Asia.

The disease did not advance westward of the peninsula of India till 1821. It had reigned in a vast extent of the presidency of Bombay, from the month of March of that year. In the month of June it appeared at Muscat, and, almost at the same time, in the islands at the entrance of the Persian Gulf, and at Bender Abouchir, the principal mart of Persia for the commerce of British India. It then proceeded along the Arabian shore of the Persian Gulf, and reached Bussorah in the month of August; from Bussorah it spread in the autumn of the same year through Mesopotamia, appeared at Bagdat, and extended as far as the desert which separates Mesopotamia from Syria. It did not overcome this obstacle, but apparently yielding to the influence of cold, dis-

* The following sketch of the progress of the disease has been derived principally from the facts detailed in the work of Moreau de Jonnès.

appeared until the spring of 1822, when it again showed itself between the Tigris and Euphrates, again advanced towards Syria, and broke out at Aleppo in the beginning of November. It again subsided during the winter. In the spring of 1823 it revived, invaded, during the summer, the Syrian towns along the borders of the Mediterranean, and unexpectedly ceased to advance without reaching Egypt. At the time that the disease was proceeding along the coast of Arabia it penetrated, in the summer of 1821, into the interior of Persia, and by the end of autumn had reached Ispahan, the capital of the Persian empire. Its progress here, also, was arrested at the approach of winter. In the spring of 1822 it again developed itself in the centre of Persia, and advanced slowly through the northern provinces of that empire. In 1823 it reached the shores of the Caspian, and, in the month of September of that year, appeared at the populous and commercial town of Astrachan, at the mouth of the Wolga.

The disease made no farther advances towards Europe until 1828, in the autumn of which year it broke out at Orenburgh, a town situated at the limit of European Russia, and the mart of commerce with the regions of Upper Asia. It subsided during the cold season, but reappeared in 1829, and extended its limits.

In 1830, it showed itself on the borders of the Black Sea and of the Caspian, and rapidly advanced into the centre of European Russia, reaching Moscow in the month of September. It prevailed in Moscow *throughout the winter.* In 1831, it continued to spread over the provinces of European Russia, appearing at *Archangel* and St. Petersburgh, and became diffused over Poland, Prussia, and Germany. While it was thus traversing the continent of Europe, it appeared in May, 1831, in Mecca, where it proved very fatal to the pilgrims; and, in the month of August, it broke out in Alexandria, and nearly at the same time in all the towns and villages of the Delta of the Nile. In the month of October of that year, it first showed itself in this country, at Sunderland, whence it advanced slowly towards the north, reaching Edinburgh, in the month of January, 1832. In the following month it broke out in London, and soon after in many other towns of England. During the same summer, we find it prevailing in Holland, France, and the Peninsula. In the early part of June, some cases occurred at Quebec, and the disease became rapidly disseminated throughout the provinces of Upper and Lower Canada, and the United States. Cholera raged at New Orleans a year or two before it appeared in Sweden, and four years before it devastated Sicily and Naples. In this progress from east to west, from the centre of Asia to the shores of America, it advanced with variable rapidity. In less than a year, it crossed the peninsula of India. From 1821 to 1823, it proceeded more slowly, through Mesopotamia and Syria on one side, and Persia on the other, from the shores of the Persian Gulf to those of the Mediterranean and Caspian Seas. In 1831, it spread from the centre of the Russian Empire, through Poland, Prussia, Germany, to the eastern coast of this country. Its principal advances have been made in the summer, and it has entirely subsided or remained almost stationary during the months of winter. It has continued in the same place from one to several months, generally longer when it appeared in spring or summer than when it showed itself at the approach of winter. In this gradual diffusion over the civilised world, it has overcome obstacles that have hitherto been sufficient to stop the progress of the plague, — it has traversed the Gauts and the Caucasus; the sandy deserts of Arabia and Persia; the Indian and Atlantic Oceans. It has existed under the most various conditions of elevation and soil, temperature and moisture; — at the level of the sea, and in the region of Napaul, at a height of not less than 5,000 feet above it; on the borders of the ocean and in the centre of continents; during the summer heats of the torrid zone, and the rigours of a Russian winter; on the arid soils of Arabia and Persia, as well as in the marshy deltas of the Ganges and the Nile. It has made its way against the winds in Europe, and the monsoons in the Indian Ocean. It has desolated small villages and populous towns — the thinly inhabited provinces of the Rus-

sian Empire, as well as the densely-peopled district of Bengal. It has spared neither sex nor age. It has attacked the same individual twice or more, and persons affected with various diseases as well as those in robust health.* It has numbered among its victims persons of all classes, and almost of every nation. But, although it has existed under such a variety of circumstances, and everywhere with characters absolutely identical, the disease has spread most rapidly and extensively in the low, dirty, and crowded parts of large and populous towns.

In the sketch we have just given we have confined ourselves to the advance of the disease, to its continued invasion of fresh territory, and have not stopped to notice its recurrence in places it had previously visited. It has reigned in the immense territory of India, from its appearance in 1817 to the present time, — as if the country that gave it birth were the most congenial to its existence — ravaging in succession its different parts, almost always subsiding at the approach of the cold season to reappear with the first heats. There is scarcely a year during this period in which it has not shown itself in Calcutta, Madras, and Bombay. In Persia and Syria, it made several irruptions from 1821 to 1830. To the nations of Europe its visits have not been renewed with such frequency. In this country, it appeared in 1832; again, but in a more limited degree, in 1833 and 1834, since which we have been exempt from its attacks, if we except a feeble manifestation in the autumn of last year, when it occurred in a very isolated manner on the Thames.

There is one gratifying circumstance in the history of these subsequent irruptions; namely, that in them the disease has in general prevailed less extensively, and for a shorter time, than at its first invasion.†

The mortality occasioned by cholera has probably been greater than that caused by any epidemic disease that has existed for several centuries. In Jessore, at the time of its outbreak, in 1817, 10,000 persons died in the first two months. The mortality was scarcely less in some other towns of India, and it has been computed that in that peninsula, from 1817 to 1830 inclusive, the number of deaths from cholera amounted to 18 millions, in a population of somewhat more than 40 millions. We have only extremely vague and scanty data respecting the ravages of the disease in the countries of Asia not subject to European dominion, but there is reason to believe that in some of these‡ they were still greater than in India. In some of the towns of Arabia and Persia the mortality is said to have amounted to one third of the population.

In Russia, in 1831, one twelfth of the population of the infected provinces is supposed to have been attacked, and the mortality to have exceeded 60,000 persons. In Paris, during the epidemic of 1832, more than 18,000 fatal cases are said to have occurred. In this country, the ravages of the disease have been much more limited. In 1832, probably 5,000 persons perished from this cause in the metropolis, and the number of deaths reported in Great Britain was somewhat more than 20,000.

Causes. The circumstances most favourable to the opinion that malignant cholera is a contagious disease, are the following — its continued extension, in all directions, from the place in which it originated, with a rapidity, not uniform, and never greater than that of human intercourse—its having, in many instances, appeared to follow the principal lines, in which this intercourse takes place—and its having frequently shown itself in a port or town, soon after the arrival there of a vessel or caravan from one previously infected.

The foregoing reasons, although we are quite ready to admit that they have

* See Med. Chir. Trans. for 1838.

† An exception to this occurred at Berlin, where fewer persons were attacked, and with a lower rate of mortality, in the epidemic of 1831, than in that of 1837. The latter epidemic was, however, of shorter duration.

‡ In 1820, the kingdom of Siam lost 20,000 persons in the single town of Baucock, its capital. " It destroyed, in 1822, in the island of Java, 102,000 persons, of whom 17,000 belonged to the town of Batavia.

" At Pekin, the capital of China, in the irruption of 1822 and 1823, the number of deaths exhausted all the means of sepulture; and a provision for this purpose was in consequence necessary from the imperial treasury." (*Moreau de Jonnés.*)

considerable force, are far from being decisive of the question. Any influence, any combination, for example, of atmospheric circumstances, might, and probably would, be progressive. Influenza, which no one, we believe, supposes to be contagious, and which on more than one occasion has almost rivalled cholera in extent of diffusion, was also progressive, although its progress was much more rapid than that of the latter disease.

With respect to the circumstance, that cholera has appeared to follow the lines of human intercourse, it may be asked, did not this result from its having attracted more notice on these lines, from their being more open to observation, and from the fact that they generally connect large and populous towns, where the disease has made the greatest havoc, and where, for various reasons, its effects have been most observed?

Granting the fact of its progression, the extensive relations and increasing activity of modern commerce must render the coincidence of its appearance in a port soon after the arrival there of a vessel from one previously infected, a circumstance of frequent occurrence.

Having said thus much against the conclusive nature of the arguments for contagion, we proceed to offer the reasons which have convinced us that the disease is not propagated in this manner. 1. The medical men and attendants on the sick have not generally been attacked in undue proportion; now as these persons are exposed in a degree incomparably greater than those who never approach the sick, they could not fail, if contagion existed, of suffering in a corresponding proportion. We have said that they did not generally suffer. Such was the case in India and in this country; and very striking instances of their exemption may be adduced. When the disease appeared in London in 1832, H. M. S. *Dovor* was fitted up as a cholera hospital for seamen, and stationed in the river, where the disease was most prevalent: more than 200 sailors *, affected with it, were admitted there: three nurses and one of the medical men lived on board; the other medical men, four in number, were in daily attendance: yet, of these persons, medical men and nurses, not one was attacked, although the former were engaged, almost daily, in examining the bodies of those who died of the disease, and that in the lowest part of the ship, in an ill-ventilated cabin, in which all the dead bodies were placed. When the disease again showed itself in the metropolis, in 1834, the medical men and nurses of the hospital-ship *Echo*, which was appropriated to the same purpose, enjoyed a like immunity: and in fact, from the first appearance of malignant cholera in this country to the present time, not one of the medical attendants of the Dreadnought, the hospital for seamen in the port of London, or of the cholera hospitals connected with it, have taken the disease.

A striking example of the same kind, noticed in Edinburgh, is given by the late Dr. Mackintosh: he says "In the Drummond Street cholera hospital" (of which he was physician) "there were 280 bodies examined. Two and sometimes three hours were spent in examining each body. The room where these examinations were conducted was a miserable place, eight feet square; generally six or eight persons were present, sometimes more; and, in an inner apartment, about ten feet square, there generally lay six dead bodies. Not one of those who frequented this den of death, and who had their hands imbrued in the secretions of the dead for six hours out of the twenty-four, were affected with cholera, although their hands were irritated and punctured daily." (*Practice of Physic*, p. 345.) A great number of instances of a like kind might be adduced, but the argument does not rest on particular examples, but on the fact that the attendants on the sick were not *generally* attacked in undue proportion, regard being had to the circumstances in which they were placed. Where cholera prevailed as it most

* In another part of this article we have mentioned 160 as the number of cholera patients admitted into the Dovor. This was the number received after the 20th of May, when the Dovor came under the management of the Dreadnought committee. Before this time the Dovor was under the government charge.

commonly did, in particular parts of a town, the medical men who attended the sick in these infected parts were of course exposed to those local influences which were the cause of cholera in their inhabitants, and suffered therefore in a greater proportion than the entire population.

The example of greatest mortality among medical men and nurses occurred during the prevalence of the disease at St. Petersburgh; but it appears, from the report of Drs. Russel and Barry, "that in some cholera hospitals, favourably situated with respect to site, ventilation, and space, very few of the attendants suffered."

"In the hospital of the Semanosfsky guards, not far from the barracks, out of forty attendants on cholera patients, six were attacked, and two died, between the mornings of the 11th and 13th." "In the military general hospital, into which upwards of 400 cholera patients had been admitted from distant quarters up to the morning of the 13th, only one attendant had been attacked."

2. The disease has not been disseminated, as contagious diseases usually are under circumstances of free intercourse: in this country it did not spread into the agricultural districts, but was confined to towns, and generally to particular parts of towns. In the spring of 1832, we witnessed the epidemic of cholera at Ely, which is built on a hill rising out of the fenny district of Cambridgeshire: the disease was confined to the low and dirty streets at the foot of the hill; no cases occurred in the high and clean parts of the town: and during the summer of the same year we observed the epidemic at Plymouth, where cholera prevailed to a great extent; there also the parts of the town inhabited by the wealthier classes were almost exempt from the disease; and, although continual intercourse with the country people was kept up, it did not spread to the rural villages adjacent. The history of cholera abounds in instances of the same kind: we shall only mention one more, which is given by Dr. Albers, in his report of cholera at Moscow. He says, "During the epidemic, it is certain that about 40,000 inhabitants quitted Moscow, of whom a large proportion never performed quarantine; notwithstanding this fact, no case is on record of cholera having been transferred from Moscow to other places; and it is equally certain, that in no situation appropriated for quarantine has any case of cholera occurred."

But here, as in the former case, the argument is not grounded on particular instances, however striking, but on the fact, that the disease has not been disseminated *generally*, in the manner of contagious diseases.

3. Another argument against the contagious nature of malignant cholera, is, that quarantine regulations have totally failed to prevent its advance. There are many instances of its having broken out in a place after the enforcement of the strictest quarantine for fourteen or twenty-one days, or even longer; so that the opinion that it is contagious can be maintained only by the supposition, that it has occasionally a long period of incubation; a supposition which is opposed by the fact, that, in cases where the time intervening between first exposure to infection and the development of the disease has been most accurately marked, the period of incubation has ranged from one to five days.

"The subsidiary force under Colonel Adams, which arrived, in perfect health, in the neighbourhood of a village in India infected with cholera, had seventy cases of the disease the night of its arrival, and twenty deaths the next day." (*Bengal Report*, pp. 22, 23.)

"H. M. 54th regiment landed at Madras on the 10th of May, in a remarkably healthy state, after a voyage of forty-eight days, from the Cape of Good Hope, and marched into quarters at Fort. St. George. Cholera appeared among the men within three days after their landing." (*Madras Report*, p. 23.)

4. But the strongest argument against the opinion that cholera admits a long period of incubation, or that it is contagious, is afforded by the shortness of the duration of certain epidemics. In 1834 the duration of the epidemic in London was less than six weeks: and, in many instances, the disease has ceased in a town within a month, or even three weeks, after its first appearance there. Instances of this kind could scarcely happen if it were contagious, or admitted

a long period of incubation. But it is not only in particular towns and in districts of small extent that the prevalence of this disease has been of short continuance. Throughout England and great part of Europe and America, it ceased entirely, and of itself, within two years of its first appearing in these countries. A parallel instance cannot, we believe, be found in the history of any other disease, capable of being communicated by contagion, and we consider this circumstance alone almost decisive that malignant cholera is not propagated in this manner.

Most of the arguments against contagion, here advanced, were illustrated by the partial epidemic of malignant cholera in London, in the autumn of 1837. During the summer of that year it had raged in Italy, and gradually advanced towards us, appearing in succession at Naples, Rome, Berlin. On the 8th of October a patient in the seaman's hospital, Dreadnought, was seized with cholera, and between that time and the 28th twenty cases occurred there, of which twelve proved fatal. None of the nurses or medical officers of the Dreadnought were attacked, although the latter lived on board, were in constant attendance on these patients, and, in all the fatal cases, spent a considerable time in examining their bodies, in a small cabin appropriated to their reception. The persons attacked with cholera were admitted into the Dreadnought for other complaints: not a case occurred in any other vessel in the Thames; and although, during the prevalence of the disease, patients were discharged almost daily from the Dreadnought, who immediately entered other vessels, they did not, in a single instance, communicate cholera to their crews. The person in whom the disease first showed itself, left Dantzic for this country on the 8th of September; no case of cholera occurred in the vessel in which he sailed; so that the disease, if introduced by him, must have had a period of incubation of at least thirty days, a circumstance extremely improbable, if we consider that the second and third cases occurred within forty-eight hours of the first; that five patients, seized on the 21st and 22d of October, had come from the four quarters of the globe, and consequently could not have brought the disease, and, at the time of their attack, had been in the hospital from two to seven days only; and that the whole duration of the epidemic was only nineteen days. This last circumstance we conceive to be of great force; it shows that of all the cases, after the first, not one presented a period of incubation at all equal to that which, to maintain the supposition that it was brought from abroad, we must admit for the first; and, as no measures of seclusion were taken with respect to these patients, it is scarcely explicable on the hypothesis that the disease is communicated by contagion.

But what tends still further to show that in this instance the disease was not introduced by contagion, is, that while cholera existed in this isolated manner in the Dreadnought, and when other parts of London were free from it, some cases occurred in the Marylebone infirmary, situated in a part of the metropolis the most remote from, and maintaining the least intercourse with, Greenwich, where the Dreadnought is stationed.

The reasons given above are, we imagine, sufficient to show that malignant cholera is not propagated by contagion: and the fact that it has prevailed in so many countries and among people so different in every circumstance of social life, proves that it did not depend on food, or on any circumstances or habits which serve to distinguish particular countries or people.

The facts noticed in a preceding part of this paper, in our recapitulation of the progress of cholera, prevent us from ascribing the disease to any atmospheric circumstances that we can appreciate, such as temperature, moisture, direction of winds, electric condition; and the isolated manner in which it has in many instances existed (as in the Dreadnought, in 1837, when it prevailed in that ship, and in no other vessel in the river,) does not allow us to ascribe it, solely, to any general atmospheric influence whatever: while the wideness of its diffusion at other times (as in 1832, when it raged at once in a considerable part of Asia, Europe, and America) prevents us from attributing it *exclusively*

to the agency of local causes, such as miasmata, filth, defective ventilation, a crowded population; such causes having, moreover, been in action for ages without giving rise to any disease resembling cholera. We can account for the phenomena only on the supposition of some peculiar atmospheric condition, capable of unlimited gradual diffusion, but rendered more active by the local circumstances that have been found most conducive to the disease. *

Symptoms of malignant cholera almost always first show themselves during the period from sunset to sunrise † — in many cases suddenly, without any evi cus modification of the patient's sensations or general health: but, more commonly, a slight feeling of uneasiness and some degree of diarrhœa announce the approach of the violent symptoms. These generally commence with watery purging, which is attended with little or no griping, and is seldom preceded by any sensible rigor. The purging is speedily followed by vomiting, and, in most cases, by cramps. The vomiting and purging are frequently repeated. The matters discharged contain, at first, the ordinary contents of the stomach and intestines, but subsequently consist of a whitish, turbid fluid, which has been likened to whey, water-gruel, or rice-water. These evacuations, which are either void of smell, or of a faint, sickly odour, are ejected forcibly, without straining or apparent effort. and are often enormous in quantity. The cramps, which begin in the muscles of the extremities, subsequently affect those of the abdomen and chest. The belly of a muscle is contracted into a hard knot with excruciating pain: in a minute or two relaxation takes place, but only for a moment; the same muscle becomes again violently cramped, or the cramp passes to another, leaving the patient scarcely an interval of ease.

There is often, from the beginning, headach, noise in the ears, vertigo, or deafness. As the disease advances, the patient falls rapidly into a state of extreme prostration: at the end of an hour or two the pulse is often scarcely perceptible, the surface sensibly cold; and, if an attempt is made to bleed the patient, either no blood flows, or a few ounces only of dark tarry blood, which does not separate, but forms a loose coagulum, is with difficulty squeezed from the arm. The discharges continue, frequently attended with pain at the epigastrium and with slight degree of colic: the temperature of the surface sinks still lower; the conjunctivæ become dry and glared, the eyes sunk in their orbits: the countenance, especially the nose and lips, assumes a leaden or blue tint, and the same hue is perceivable in the extremities, which are often of icy coldness. The tongue is pallid, or slightly blue, cold, and commonly covered with a thin coating of slimy mucus: the palms of the hands and the soles of the feet are shrunk and sodden, as if long soaked in water; and the general volume of the body is much diminished. The pulse is feeble and fluttering, or imperceptible; there is a sense of burning heat at the præcordia, with urgent thirst, and an insatiable desire for cold drinks; the voice becomes extinct, or feeble and hoarse; the urine is suppressed, the salivary and all other glandular secretions are arrested. There is dyspnœa, attended with high and rapid breathing, and with an intolerable sense of oppression; extreme jactitation, so that the patient can with difficulty be kept under the bed-clothes, or in bed. In the midst of this general disturbance the intellect, although incapable of exertion remains clear; the memory perfect. At the end of some hours, the violent symptoms subside, the discharges and cramps cease; but the heat of the surface and the pulse do not return, or they return only slightly and transiently, the patient relapses into his former state, the face becomes bedewed with a cold clammy sweat, and the scene closes in death, sometimes within four or five

* Dr. Holland has lately suggested, that the course of cholera may be well represented by the propagation and migration of insect swarms. This idea, which certainly accords better with the facts noticed in the preceding pages, than any other hypothesis that has been advanced to explain them, is developed with great ingenuity and ability, in an article entitled, "On the Hypothesis of Insect Life, as a Cause of Disease."

† See Curtis, on the Diseases of India; Jackson's report of Cholera in Paris, in 1832; and a report of Cholera in the Seamen's hospital, Dreadnought, by Dr. Budd and Mr. Busk, published in the *Medico-Chirurgical Trans.* for 1838.

hours, not unfrequently within seven or eight, but more commonly at the end of twelve, twenty-four, or thirty-six hours from the attack; the patient retaining his mental faculties to the last.

Such is the general progress of those cases that prove fatal during the cold stage. When this does not happen, after the violent symptoms have continued some hours, and the patient has fallen into a greater or less degree of collapse, the discharges cease or become less frequent, the heat of the surface returns, the skin loses its leaden tint, the pulse regains its power, the anxiety and oppression diminish, bile again flows into the intestines, the secretion of urine is restored: in fact, reaction becomes fairly established, and the disease in its future course assumes one of the following forms:—1. The patient remains feeble for some days, but the convalescence is immediate, and not interrupted by the occurrence of any internal inflammation. This termination is most common in those cases in which the symptoms of the preceding stage have been mild. 2. The recovery is retarded for a period, varying from a few days to several months, by the continuance of gastric and intestinal irritation, indicated by the symptoms we have already described as occasionally occurring in sporadic cholera after the subsidence of the violent symptoms. 3. The collapse is succeeded by a state which has been denominated the secondary fever of cholera, in which the patient presents a typhoid aspect: the cheeks are flushed, the conjunctivæ suffused, the tongue dry and red; there is stupor with extreme drowsiness, and occasionally subsultus tendinum, and low muttering delirium. A minute papular eruption often appears on the face and body: but there is no great heat of skin or quickness of pulse.

After having presented these symptoms the patient sometimes recovers, but more commonly falls into a state of complete coma, and, without offering any more obvious signs of local disease, sinks, in some cases after a few hours, in others at the end of a week or more. This secondary fever is most frequent in cases in which the early symptoms are unusually severe, and the cold stage protracted.

We have noticed as characteristic of the cold stage:—1. *The leaden or blue colour of the skin*,—an appearance which has attracted much attention. It results from distension of the capillaries by dark-coloured blood, and varies much in degree, but is most striking when the disease advances rapidly in persons of a full and sanguineous habit. 2. *The diminution of animal heat.* This is greater than in any other disease: the surface of the body, the inside of the mouth, and even the breath of the patient give to the hand a sensation of coldness; and a thermometer placed under the tongue, which, in ordinary circumstances, indicates a temperature of about 98° F., rises only to 77° or 79° F. Dr. Davy has shown that in the cold stage, even when the inspirations are ample and frequent, the air expired is not only colder than usual, but contains less than the ordinary proportion of carbonic acid. The low temperature of the body in cholera probably depends chiefly on deficient arterialisation of the blood, in consequence of imperfect circulation. In morbus cœruleus, in which arterialisation is deficient from malformation of the heart, the temperature of the body is likewise many degrees lower than natural.* (*Müller's Physiology, Transl.*, p. 75.) 3. *The character of the blood and of the evacuations.* We have already alluded to the defective circulation, dark colour, and tarry consistence of the blood during the cold stage of cholera. Chemical analysis has discovered in it a great deficiency of water, which, according to M. Le Canu, exists in some cases in less than one half of its usual proportion; a diminution in the proportion of fibrine; and the total absence of a very small proportion of carbonate of soda. The peculiar aspect and consistence of the blood, and its imperfect separation into serum and clot, are the natural consequences of these deviations from its normal state.

* We have observed similar diminution of animal heat in cases in which there was great difficulty of breathing from extensive emphysema of the lungs.

In the blood of some cholera patients, who had secreted very little urine for several days, the presence of urea has been detected.*

The gruelly or rice-water evacuations, which form such a striking symptom of malignant cholera, are distinctly alkaline, and consist of a serous or watery fluid containing whitish shreds or flocculi, of the colour and consistence of paste or boiled rice, and of a specific gravity greater than that of the liquid, so that they invariably, after a short time, fall to the bottom of the vessel. The liquid portion, according to the analysis by Dr. O'Shaughnessey, is composed of water, carbonate of soda, and the other saline ingredients deficient in the blood, but contains neither albumen, casein, nor the principles of the bile: the solid portion seems to be a mixture of albumen and casein.† Thus, the evacuations contain the most remarkable of the principles deficient in the blood, and seem to be composed chiefly of its serous part.

In some cases that came within our own observation the evacuations, both from the stomach and intestines after the cold stage had been considerably protracted, assumed a peculiar character, which was apparently owing to the presence of the colouring matter of the blood. Instead of preserving their usual whitish or gruelly aspect, they became brownish or black, from the suspension in the colourless liquid of brown or black flocculi, sufficiently numerous to impart their colour to the whole mass, as seen by reflected light. When poured on a filter, the colourless fluid, which was not albuminous, transuded, and the brown or black flocculi were left on the paper. In one case, in which the evacuations were of this character, the dejections subsequently became scanty and of a uniform plum colour, evidently from the admixture of blood.

Urea, which exists in unusual quantity in the blood, has also been detected in the bile. Dr. Roupell, to whom we are indebted for the knowledge of this fact ‡, ascribes to its presence in the blood the secondary fever of which we have already spoken, — a state, he remarks, that bears much analogy to that observed in Ischuria renalis.

We have already remarked that, during the great commotion of the system in the cold stage, when the breathing is quick and laborious, and the animal heat no longer kept up, when the blood has almost ceased to circulate, and the various secretions are suspended, the patient retains his intellect. In our attendance on persons suffering under this terrible disorder, nothing has appeared to us more singular than this circumstance: in the last extremity the answers of the patient are quite rational, his memory just; his faculties, however, are blunted; he is averse to all mental exertion, seems unsusceptible of emotion, and exhibits the utmost indifference to his own fate and to all surrounding objects.

Malignant cholera varies in a remarkable degree in the severity of its symptoms, and the rapidity of its progress. The vomiting, purging, and cramps, the most striking symptoms of the disease, are not all present in every case. We have never seen a case in which there was no purging; but practitioners in India have described cases, very rapidly fatal, in which spasm was the only symptom. But in these cases, although no discharges took place, the bowels were found distended with the characteristic fluid. It is not very uncommon,

* The discovery of urea in the blood, in cholera, was made by Dr. O'Shaughnessey, who found as much as 3·66 parts of this principle in 1000 parts of blood, taken from a subject who died of cholera, and who had made very little urine for eight days. Its presence in unusual quantity in the blood, in this disease, unquestionably results from suppression of urine. In ordinary circumstances it cannot be detected in the blood, being separated from it by the kidneys as fast as it is formed; but in the blood of animals, which lived some days after the extirpation of both kidneys, it was found, by Prevost and Dumas, in very large quantity. (*Roupell on Cholera*, p. 84. *Müller's Physiol. Transl.* p. 151.)

† Dr. Böhn, of Berlin, has lately concluded, from microscopic examinations, that the sediment in the evacuations in cholera is composed of fragments of the epithelium of the mucous membrane of the intestines. (*Dub. Journ.*, No. 44.)

‡ The analysis was, in this case also, made by Dr. O'Shaughnessey, to whom the bile was sent for this purpose by Dr. Roupell. This bile, which was taken from a patient who had made very little urine for eight days, did not differ in appearance from ordinary bile, but contained, in 1000 parts, 6 of salts, *and* 3 *of urea*. (*Roupell on Cholera*, p. 84.)

however, to meet with cases sufficiently characterised by the aspect of the patient and the nature of the evacuations, as cases of cholera, in which vomiting or cramps, or both these symptoms, are wanting. Of sixty cases described by Dr. Jackson, in his report of cholera in Paris, in 1832, there were two without vomiting, and five in which there were no cramps. In twenty cases that have recently fallen under our own observation, there were two in which no vomiting or cramps occurred. (*Med. Chir. Trans.* for 1838.)

Prognosis. In London, in 1832, judging from the reported cases, the mortality was about one half of those attacked; but we are inclined to believe that it was greater than this, and that the proportion of recoveries was increased by the insertion of cases, incorrectly set down as cases of cholera, but retained under this head, in order to render the returns less alarming. In the Dovor, the cholera hospital for seamen, of 160 patients, most of them robust men, well nourished, and in the prime of life, 93, or more than 4 in 7, died; and in this country, as elsewhere, the disease was observed to be most fatal in persons capable of the least resistance — in women*, in subjects weak from disease or want of sufficient nourishment, and particularly in the aged and in infants. Advanced age is not only unfavourable to recovery, but predisposes to the disease. Children are said to have been less frequently attacked than adults; and the proportion of deaths was comparatively small in persons between the ages of fifteen and twenty; while the disease occurred more frequently, and was in a remarkable degree more fatal in persons in the decline of life. Many of these points were illustrated by the cases received into the Dovor, which, as they all occurred in sailors, persons similarly circumstanced and leading the same kind of life, who were admitted without any restriction, are well adapted to afford proof of the influence of age, within certain limits, on the liability to cholera, and on the mortality in that disease. Of the 160 patients, 57, or more than one third, were forty or upwards. By a recent regulation, the ages of all sailors who enter the port of London are registered at the custom-house. We have obtained permission to examine these registers, and have found that of 5,000 sailors, taken consecutively, 961, or considerably less than one in five, had arrived at the age of 40. But the predisposing influence of advanced age is rendered more manifest by taking, in the two classes, ages still greater. Of the cholera patients, 22 in 160, or more than 1 in 8, were of the age of fifty or upwards; while of the sailors registered at the custom-house, 289 in 5,000, or less than one in seventeen, were of this age; so that the proportion of cholera patients of the age of fifty or upwards is more than double what it would have been were all ages equally liable to this disease. The influence of age on mortality is even more clearly shown. The mortality was least in patients between the ages of fifteen and thirty; and in these the number of deaths was less than that of recoveries: it was greatest in patients above the age of fifty: of the 22, who had arrived at this age, only two recovered; the age of each of these two was fifty-three: of 13 whose ages exceeded fifty-three, not one recovered.

The same records serve also to show the influence of previous health on the mortality. 145 cases happened among the crews of vessels in the river, in persons who may be presumed to have been previously in good health; and of these 82, or about 4 in 7, terminated fatally; while of the remaining 15 cases, which were brought from the seamen's hospital, Dreadnought, and which occurred there in persons admitted for other complaints, 11, or nearly three fourths, proved fatal. (Vide *Report*, ut suprà.)

Another circumstance that must lead us to form an unfavourable prognosis is unusual severity of the early symptoms. (Vide *Jackson on Cholera in Paris* in 1832.) Experience has shown that those cases which are mild at the beginning, supply a great proportion of the recoveries.

* Jackson's report of Cholera in Paris, 1832. Farr on mortality in Cholera, at Rome. Report of British Association for 1838.

It has been remarked that very few patients recover, in whom there is a *combination* of those symptoms which characterise collapse; loss of pulse at the wrist, great coldness and lividity of the surface, and complete suppression of urine: yet neither these symptoms, nor any character hitherto noticed in the evacuations, can be considered of absolutely fatal augury.

A cold clammy sweat always precedes the fatal termination in the cold stage; it is, therefore, the most discouraging symptom. Cramps, however violent, need not add to our alarm: a case, in which they were more severe than in any other we have witnessed, was in other respects mild; and in this circumstance our experience is confirmed by the general testimony of physicians.

The circumstances, which should encourage us to hope for a favourable issue, are, of course, on the part of the patient, the prime of life, previous strength and good health; as regards the disease, mildness of the symptoms of collapse, and a return of heat, of pulse, and of strength, with the restoration of the secretion and elimination of the urine and the bile,—symptoms which bespeak the establishment of complete reaction. When, however, the collapse has been great or protracted, this reaction should not inspire us with too much confidence: the patient has still, perhaps, to submit to another ordeal, equally to be dreaded, the secondary fever of the disease.

Anatomical characters. In subjects who die in the stage of collapse, the features, after death, are shrunk; the lips, the tips of the nose and ears, the nails of the fingers and toes, are of a leaden hue: the cheeks and upper part of the chest partake somewhat of the same colour, but in a much less degree than during life; and this colour gradually fades after death, while the skin of the entire back becomes of a purple more and more intense, obviously from the blood's gravitating to the latter part. The body and extremities are very rigid, the fingers drawn inwards, the skin of the palms wrinkled.

The follicles at the base of the tongue are generally enlarged.

The mucous membrane of the œsophagus is almost always pale and healthy, but now and then presents conspicuous follicles.

The appearance of the outer, or peritoneal surface of the stomach, and small intestines, varies according to the period at which the disease proves fatal. When death occurs early, or during collapse, the peritoneum is viscid, and the stomach and small intestines are, externally, of a pale rose colour. The viscidity is not observed, or it exists only in a slight degree, and the rose-colour is replaced by the ordinary grey tint of the intestines in those cases that prove fatal after decided reaction. The large intestines are grey externally in every case.

The stomach is generally large, from the distension it has undergone. Its mucous membrane, in some cases, whether rapid or protracted, in bloodless subjects, is pale throughout, but commonly offers, either in the splenic or pyloric extremity, or in both, some degree of redness, arising from the injection of very minute vessels on its free surface. These vessels are not arborescent, but appear as short, red dashes, each about a line in length.

The mucous membrane has rarely undergone any remarkable change in texture, but in most cases it is thickened, and presents a mammellated* appearance, either general or confined to the pyloric extremity. In some instances, by drawing the coats of the stomach between the finger and thumb, and using some pressure, a white opaque fluid is squeezed out, and the mammellated appearance effaced, the mucous membrane of the portion so treated being afterwards smooth and of normal thickness and consistence. Sometimes, it offers a few patches of adherent mucus: and we have seen a case, fatal at the

* This term was introduced by M. Louis, who first described the particular state of the mucous membrane of the stomach which it expresses, and which he considers as the result of chronic inflammation. In this opinion he is followed by M. Andral and other pathologists. We have found it, however, in instances in which the patients during life exhibited no symptom of such an inflammation; and the dissection of patients who die during the cold stage of cholera shows that it may come on very quickly.

end of seven hours, in which there was a coating of viscid adherent mucus over its entire surface. In this case there was the mammellated appearance before spoken of, but it could not be effaced by pressure.

The mucous membrane of the duodenum is, in some cases, vascular, in others pale; and now and then it has a greyish appearance, as if dusted with a fine black powder. The follicles, or solitary glands, are in all cases very conspicuous, and give the membrane more or less of a granular aspect: they are always most numerous near the pylorus, become gradually less so as we recede from it, and are not observed in the jejunum.

The coats of the small intestines, when death takes place during collapse, are thickened, and of a doughy feel. The mucous membrane, in some bloodless subjects pale and sodden, generally presents increased vascularity, which occasionally gives rise to patches of a purple colour in the depending portions, especially near the termination of the ileum.* It often exhibits the grey appearance that we have already noticed in the duodenum: this greyness, which results from minute black specks at the apices of the villi, is observed especially in cases in which the evacuations during life have contained brown flocculi. We have found it in the entire extent of the small intestine, and, in one instance, confined to the jejunum and upper part of the ileum. The texture of the mucous membrane has rarely undergone any appreciable change.

The glands of Peyer are remarkably developed in almost all cases, and generally the most so in those that prove fatal early, or in the stage of collapse. They are of the same colour as the surrounding membrane, and, when the latter is pale, are dotted with black points.

The glands of Brunner may be seen, in almost every case, in the lower portion of the ileum, as small, elevated beads, of the same colour as the membrane; and, like the glands of Peyer, are generally most marked in those cases that prove fatal in the cold stage.

The mucous membrane is, in general, more or less coated with the pasty substance, of which the flocculi in the evacuations consist. The other contents of the intestine are like those discharged during life, and require no particular notice: they are devoid of any fæcal odour, and are tinged with bile in those cases only in which reaction has taken place. In some cases in which reaction was transient, we have seen this biliary tint limited to the duodenum and upper part of the jejunum.

The cæcum and ascending colon are commonly distended, while the descending colon is, in many instances, contracted. The mucous membrane of the large intestine is, in some cases, pale throughout, in others it offers various degrees of redness. It is almost always sprinkled with conspicuous follicles, which are seen as flat, slightly elevated circles, about a line in diameter, with a central black speck; and which, in every case, diminish in number, and become less conspicuous as we recede from the cæcum.

The mesenteric glands, which are generally enlarged, are, in some cases, purplish, and, when cut into, give issue to dark liquid blood; in other cases, they are pale.

The liver presents no unusual appearances: in a few instances, we have observed small ecchymosed spots on its surface, and black fluid blood frequently escapes from the large vessels divided by incision. In all cases that prove fatal during collapse, the gall bladder is found distended with bile of a dark-green or olive colour. Many pathologists have noticed, in such cases, a stricture at the mouth of the common duct, preventing the flow of bile into the intestine, when pressure is made on the bladder. Of the existence of such a stricture we have not, however, been able to convince ourselves, and are of opinion that further observation is requisite in order to establish the fact.

The pancreas presents nothing unusual.

* These purple patches seem to result from gravitation of the blood, and to be analogous to the vinous stains on the back.

The spleen is frequently of a light red colour, and, in most cases, of natural size, or smaller than usual, and firm.

The condition of the lungs varies as the patients die at a period more or less remote from the attack. When death occurs speedily or in the cold stage, they are found healthy or simply congested; while in a large proportion, according to the observations of Mr. Jackson, who, we believe, first drew the attention of physicians to this circumstance, in one half of the cases which terminate fatally after the establishment of decided reaction, one or both lungs present unequivocal traces of pneumonia. We have recently made dissections in eleven fatal cases of malignant cholera; and found the lungs healthy or merely congested in four or five cases that proved fatal within thirty-six hours; while, of the remaining six cases, in which the patients lived at least forty-five hours after the attack, four presented the anatomical characters of pneumonia. In one of these cases, which proved fatal at the end of forty-five hours, the pneumonia was very partial, interlobular, and confined to the lower lobe of the right lung; in two, fatal at the end of 96 and 138 hours, respectively, the lower lobes of both lungs were in a state of red hepatisation.

The pneumonia, in such cases, is latent, giving rise to no symptoms during the life of the patient which would lead one to suspect its existence. The fact of its frequently existing, made known to us by dissection, is, therefore, of the greatest practical importance, and shows the propriety of investigating by auscultation the condition of the lungs in all cases in which reaction has been established.

The larynx and trachea sometimes contain a frothy fluid, and their lining membrane often presents increased vascularity; but we have never noticed any change in its texture, or any affection of the pleura in subjects who died of this disease.

The pericardium is sometimes unusually dry and viscid, but much less frequently so, and in a less degree, than the peritoneum. In a few instances, in which the cold stage was very protracted, we have observed ecchymosed spots on the surface of the heart.

The muscular substance of the *heart* is generally flabby and purplish: the ventricles are often contracted, and the heart, when cut into, presents in a slight degree the appearance which has given rise to the designation, concentric hypertrophy. Fibrinous clots are frequently found in the right ventricle, but seldom, and only in protracted cases, in the left; and never in these, unless they exist also in the right. In other cases, in those chiefly that prove fatal during collapse, the ventricles contain dark, fluid, or grumous blood.

In the veins and in the arteries, even in the aorta, the blood is also dark and fluid or grumous; but, like that in the ventricles, it imparts no stain to their lining membrane.

The kidneys are natural in size and texture. In most cases, the cortical substance is purplish throughout, or pale, but offering dark, congested vessels; and from the mammillary points, a whitish fluid, having somewhat the appearance of pus, can be squeezed out.*

The urinary bladder contains only viscid mucus, and is shrunk under the pubis and contracted, in subjects who die during collapse; but we find in it a small quantity of urine in some of the others.

In the organs of the nervous system, there is no trace of disease except a certain degree of congestion in the brain and its membranes, which is met with in some cases.

Nature. Such are the appearances observed on dissection in persons who die of malignant cholera. If we regard the morbid changes with the view of ascertaining the seat and nature of the disease, we shall perceive that the chief

* Some pathologists have laid great stress on the white, creamy, fluid, that can be expressed from the mammillary points of the kidney, as a character peculiar to malignant cholera; but we have met with it in subjects who died of other diseases. It probably consists of mucus and the constituents of the urine in a state of concentration.

of these changes are offered by the coats of the intestinal canal and by the blood; the condition of the latter, as to colour and fluidity, being sufficient to account for the unusual appearances of other organs in patients who die in the cold stage. In the intestinal canal, the principal alterations are unusual development of the intestinal glands or follicles, increased vascularity, and unnatural thickness of the mucous coat, from its impregnation, in the entire extent of the stomach and small intestines, with a fluid similar to that constituting the discharges. In the blood, chemical analysis has discovered little more than diminution of its serous part. It will be readily admitted that these changes, although they may serve to explain some of the symptoms of cholera, do not, of themselves, lead us to any certain knowledge of its real nature. Here, as in many other instances, we obtain more insight into the real nature of the disease, by inquiry into its history and symptoms. In the very threshold of this inquiry, two questions naturally arise: —

1st. Is malignant cholera essentially different from sporadic? The nature of the evacuations forms a striking mark of distinction between the diseases which we have thus contrasted. In the latter they contain an unusual quantity of bile: in the former, at a certain period, they are devoid of this principle, and present the characteristic appearances we have described; and this difference in the nature of the evacuations does not depend on the greater severity of malignant cholera. Some cases of malignant are not more severe than cases of sporadic cholera, but are still contrasted with them in the colour and character of the evacuations. The blue colour of the skin, that gives such a peculiar aspect to malignant cholera, is rarely remarked in sporadic: it results in the former from the condition in which the blood is left by the loss of its serous part. But there are other circumstances which show that the diseases are essentially different: malignant cholera occurs at all seasons, sporadic cholera almost exclusively in autumn; the former disease in the majority of cases proves fatal, and often at the end of a few hours: in the latter, patients generally recover, and when the disease does terminate fatally, it is seldom in less than two or three days: in one, cases occur sporadically; in the other, the disease is epidemic.

2dly. Was malignant cholera known to the ancients? There are some passages in the works of Aretæus and Celsus which have led to the supposition that those authors were acquainted with this disease. Aretæus describes the evacuations in cholera as being, "at first, stercoral; then pituitous, afterwards bilious." Celsus says that the evacuations are of various colours, "sometimes black, sometimes white." But these incidental remarks do not justify us in concluding that these physicians were ever called on to treat malignant cholera. Men so observing would surely have noticed in more express terms characters so peculiar as those presented by the evacuations in this disease. Besides, their general description of cholera, the time and manner of its appearance, are in accordance with the observations of modern physicians on sporadic cholera, but not at all applicable to the pestilence by which we have recently been visited.

We infer, then, that malignant cholera is essentially different from sporadic, and that it has only recently appeared in Europe. It will be readily seen that this inference confirms the conclusion arrived at in a former chapter that the disease has its origin in some new and peculiar principle.

The supposition advanced by an ingenious author *, that malignant cholera consists in inflammation of the mucous coat of the stomach and intestines, is opposed by the fact, that inflammations of these viscera occur in their greatest severity without giving rise to the same symptoms; and that the appearances after death do not accord with the ordinary effects of inflammation. Besides, if this disease be simply inflammation of the coats of the intestinal canal, why have we not witnessed it until the last few years? The history of medicine offers examples of the occurrence of new specific diseases, but there is no evi-

* Broussais.

dence that there have been any modern additions to the list of simple inflammatory affections. The recent origin of malignant cholera, then, as well as its epidemic nature, concur with the reasons above assigned, and prevent us from considering it a simple inflammation; a supposition, indeed, utterly untenable: while the peculiar character of the evacuations, the unusual development of the intestinal follicles, the rapidity with which the disease proves fatal, its wide diffusion, and the permanence of its essential characters in circumstances the most various, show that it every where depends on one and the same special cause: a cause, whose first effects are manifested in derangement of the functions of the intestinal canal, but which exerts on the economy the action of a powerful poison.

If we consider the symptoms in order to ascertain the manner in which this poison acts, we arrive at no definite conclusion. It will be seen from our remarks on treatment, that many of the most striking symptoms, the disorder of circulation and respiration, diminution of animal heat, thirst, the leaden hue of the skin, the prostration and the spasms, result from the condition in which the blood is left by the elimination of its serous part. The almost total suppression of urine and other glandular secretions, is probably an effect of the same cause. It is this elimination, therefore, this intestinal hæmorrhage, if we may so term it *, that constitutes the fundamental and primary symptom of the disease. But to what is this elimination owing? Is it caused by direct action of the poison on the coats of the intestinal canal, or does it result from absorption of the poison and consequent morbid condition of the blood itself? Dissection does not enable us to give a satisfactory answer to these questions; but there are some circumstances in the history of the disease which render the latter hypothesis by far the more probable. We could adduce many instances which scarcely leave a doubt that the disease does not manifest itself immediately on exposure to the influences that produce it, but that it has a period of incubation, short, certainly, in many cases, but still sufficient to render it improbable that the symptoms are produced by the direct local action of an irritating agent. Again, the fact that one person is attacked while others escape, who, as far as we can judge, have been exposed to precisely the same influences, is analogous to what happens in the case of other diseases produced by absorption of a virus, but is scarcely explicable on the supposition that the symptoms are caused by the direct impression on the coats of the intestinal canal of an agent of such extraordinary power

Whatever be this agent the almost constant accession of the violent symptoms during the night renders it probable that its influence is then more powerful than by day.

Treatment. There is no disease in which it is more difficult to estimate the effects of remedies than in cholera. This arises in part from the difficulty of appreciating the share which the circumstances of age and sex, previous health and nourishment have in determining the issue; but chiefly from the great difference in the severity of individual cases. The mortality has been found to vary in different epidemics, and greatly in different periods of the same epidemic, without our being able to ascribe this variation to any difference in the treatment adopted or in the previous condition of the patients. We have already stated that the mortality in the *Dovor*, in 1832, was 93 in 160, or about 5 in 9; while, during the epidemic of 1834, in the *Echo*, by which the *Dovor* was replaced, it was 12 in 36, or only 1 in 3.

In 1834, the duration of the epidemic in London was less than six weeks: in 1832, the first cases occurred in February, and the disease did not disappear from the metropolis until the January following. Its greater mildness, as the epidemic approached its termination, is shown by the records of the Dovor.

* The word *hæmorrhage* is not strictly applicable, even if used to express the escape of the serous part of the blood only; since, in malignant cholera, there is not simply an escape of the serum, but also a separation of its albumen, which does not exist in the liquid part of the evacuations.

Of 137 cases admitted from the 20th of May to the end of September, 86, or more than 5 in 8, proved fatal; while of 21 patients received during the months of October, November, and December, 15 recovered.

Before then, any positive conclusion can be arrived at respecting the efficacy of different modes of treatment, the patients must be classed: regard must be had to the age, the sex, the previous health and regimen of the patients, as well as to the period of the epidemic, and to its general character as to mildness or malignity; and we must be careful not to draw general inferences from a small number of cases. The subject has not yet been studied in this manner; and it is to want of precise data that the reader must ascribe the vagueness of the following remarks on some of the modes of treatment that have hitherto been recommended.

Heat and friction have been employed, in order to restore warmth and to lessen the severity of the cramps. To the first object they certainly contribute in mild cases; but in very severe ones they generally prove ineffectual: for the second, namely, alleviation of the torments occasioned by cramps, no means have proved so successful as diligent friction. The relief given by it is immediate, and it is not uncommon for patients, at each recurrence of the spasm, to implore its repetition. It may be performed by the hand, with flannels, or with a small hand-brush. A good mode of applying heat is by bags of hot bran, or sawdust, which retain their heat a long time; but one still better, is the hot-air bath.

When practised at the onset, before the circulation has become too languid, bleeding seems to have some influence in arresting the course, or mitigating the severity of the disease; but it seldom happens that the patient is seen at that time, and, at the end of an hour or two, when the surface is cold, either no blood will flow, or we can squeeze from the arm a few ounces only of thick tarry blood, the abstraction of which is in general followed by no amendment. In extreme states of collapse, the temporal, or even the radial artery has been opened, and no blood has flowed. It is difficult to estimate the effect of bleeding in the early stage of the disease, from the circumstance that it is most frequently practicable in cases, which at their origin are comparatively mild, and which experience has shown to be those in which a favourable issue is most common.

But there is another period at which bleeding can be practised, namely, after the establishment of decided reaction; and here it seems to have been productive of benefit in moderating inflammation of the abdominal viscera, or the pneumonia, which exists so frequently in the secondary fever of this disease.

Opium is useful in checking diarrhœa on its first appearance, and, in conjunction with bleeding at the onset, has, in some cases, seemed to arrest the disease; but, when considerable collapse has taken place, opium exerts no essential influence.

Mustard emetics and ipecacuanha, like almost every other remedy, in turn* have been extolled in the treatment of cholera; but extended experience has not warranted the panegyrics of their advocates.

Calomel, in scruple doses, frequently repeated during the cold stage, has been strongly recommended by practitioners in India. It has been supposed to have great virtue in restoring the natural secretion of bile, and in promoting its flow into the intestines; a circumstance which, at this period of the disease, generally betokens a favourable change in the condition of the patient. The plan has been extensively tried in this country, but its results have not justified the encomiums that have been so liberally bestowed upon it: in fact, the great and nearly equal rate of mortality under this and every other mode of treatment that has hitherto been adopted, is sufficient to show the general inefficacy of them all.

* The supreme court of Ava recommended, as an infallible specific, that the inhabitants should wear in their ears a scrap of paper, on which was written the title of the presumptive heir to the throne. (*Moreau de Jonnes.*)

The treatment of cholera by salines was first suggested by Dr. Stevens. Its adoption was founded on the opinions he held respecting the nature of the disease, which he supposed to consist essentially in deficiency of the saline ingredients of the blood. This deficiency it was his object to restore; and he advised, for this purpose, that the patient should take, every half-hour or hour, according to circumstances, half a drachm of sesqui-carbonate of soda, a scruple of muriate of soda, and seven grains of chlorate of potash, dissolved in half a tumbler of water. We have seen this plan tried in some cases, certainly not with the good results promised by its early advocates, and we believe that, at present, most medical men agree with us in considering it a remedy of very doubtful efficacy. The deficiency of saline ingredients in the blood is the effect not the cause of the disease, and arises from the continual elimination, through the stomach and intestines, of the serous portion of the blood in which these salts are dissolved. The saline ingredients, which it is attempted to restore, are, therefore, already in the intestinal canal, and would be again absorbed, if the mucous membrane of the stomach and bowels were in a state to perform this function; but the fact is, that this membrane is in a condition the very reverse of absorbent; and it is this condition that prevents us from entertaining very high expectations from any remedy applied to its surface. A more heroic and more promising method of introducing salines was first proposed by Dr. O'Shaughnessey: it consists in injecting a solution of them into the veins. This plan was extensively tried in Edinburgh by Dr. Mackintosh. He employed a solution of ℥ ss of muriate of soda and ℈ iv of sesqui-carbonate of soda in ten pints of water, at a temperature varying from 106° to 120° Fah.; this solution was injected slowly, half an hour being spent in the gradual introduction of about ten pints. The immediate effects of this treatment are very striking, and show that a large share of the symptoms of malignant cholera is owing to loss of the serous part of the blood. After the injection of a few ounces, the pulse, which had ceased to be felt at the wrist, becomes perceptible, the heat of the body returns. By the time three or four pints have been injected, the pulse has become good; cramps have ceased; the body, that could not be heated, has become warm; and, instead of a cold exudation on the surface, there is a genial moisture; the voice, before hoarse and almost extinct, is now natural; the hollowness of the eye, the shrunken state of the features, the leaden hue of the face and of the body, have disappeared, and the expression has become animated; the mind cheerful; restlessness and uneasy feelings have vanished; vertigo, noise in the ears, and sense of oppression at the præcordia, have given way to comfortable feelings; thirst, however urgent before the operation, has ceased. The secretion of urine was soon restored; but in this, says Dr. M., (from whom we have borrowed the substance of the foregoing description), we were more frequently disappointed than in any of the other favourable symptoms. But these promising appearances were not lasting; the discharges continued, and the evacuations became even more profuse; the patient soon relapsed into his former state, from which he might again be roused by a repetition of the injection, but the amendment was transient, and the fatal period not long deferred. Of 156 patients treated in this manner at the Drummond Street Hospital (of which Dr. M. was physician), only 25 recovered, — a small proportion. It is proper, however, to add, that this method was adopted only in cases considered hopeless.

The result of these cases proves, what we have before stated, that loss of the serous part of the blood does not constitute the disease, although the elimination of this part, by leaving the blood in a condition, in which it is difficult of circulation and unfit for the functions of the viscera, is productive of many of the most striking symptoms of cholera; and, in some cases, perhaps, the immediate cause of death itself.*

* The collapse seems to depend chiefly on the blood's not being sufficiently liquid to circulate. It appears from the experiments of Prevost and Dumas, that the vivifying power of the blood resides mainly in the red particles. An animal bled to syncope is revived by the injection of

We have dwelt on this plan on account of the immediate and striking effects that have followed its employment, and the insight it has given us into the cause of many of the phenomena of the disease; but chiefly, because, from the unfavourable condition of the intestinal canal for absorption, we consider this method of introducing our remedies as most likely to lead to future success. Salines have already been tried, but there still remains a class of drugs, of a wide range, to which the same method is applicable. We know that many drugs, injected into the veins, have the same effect as when given by the mouth: tartar emetic, for instance, brings on vomiting as certainly when administered by the former method as by the latter. But, in recommending experiments of this kind, we of course advise that they should be first tried in extreme and hopeless cases. There is, however, one objection to this method, which must not be lost sight of, and which may always be urged against the employment of it in mild cases: we allude to the occasional production of fatal phlebitis.

Acetate of lead, which, in conjunction with opium, has long been found of service in dysentery, has been lately recommended, in very strong terms, by Dr. Graves, of Dublin, as a remedy for cholera. He orders a scruple of acetate of lead and a grain of opium to be made, with conserve of roses, into twelve pills, and one of these pills to be given every quarter of an hour during the stage of collapse; otherwise, every hour, or every two, three, or four hours. We have tried this plan in a few cases only, and consequently are not entitled to pass judgment on its merits: the high character of its proposer, and the confident tone in which he recommends it, will, we trust, in the event of a return of cholera, induce others to submit it to the test of experience.

The methods of treatment above mentioned are principally applicable to the cold stage of cholera. When reaction has taken place, or the stomach has ceased to reject liquids, and has become again disposed to absorb, the most important indication is to avail ourselves of this organ as a channel through which to repair the loss the blood has sustained in its serous part.* This is best accomplished by giving liquids frequently and in small quantities. We have employed soda water at this period, and would strongly recommend it on account of its being easily tolerated by the stomach, and from its containing some of the saline ingredients, which are deficient in the blood. The prescription of Dr. Stevens seems to promise advantages in this stage of the disease.

When speaking of the appearances on dissection, we remarked the frequency of pneumonia in cases that prove fatal after reaction. On account of this frequency, and the latent form in which pneumonia exists in these cases, we again urge the importance of examining by auscultation the condition of the lungs in all cases in which reaction has been established. Where the presence of pneumonia is ascertained, we would advise bleeding from the arm, or by cupping, and are inclined to give preference to the latter method. Experience has shown that, notwithstanding the profuse evacuations that have taken place, it may be had recourse to with perfect safety. On the prudent employment of this remedy and on the administration of salines, we must chiefly rely when the complication in question exists. We do not advise any treatment more specific, such as that by tartar emetic, so advantageous in idiopathic pneumonia. If convalescence be retarded by inflammation or irritation of the intestinal canal, we may employ the means recommended for the treatment of cases of sporadic cholera having a like termination.

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blood of one of the same species, even when this blood has been deprived of its fibrine, but not by the injection of water, or pure serum. The effect of such injection in the cold stage of cholera, results from its causing the red particles, which are already present, to circulate.

* We have before remarked, that the secondary fever of cholera has, with much plausibility, been ascribed to excess of urea in the blood. This principle accumulates, owing to suppression of the urinary secretion, which suppression is caused by deficiency of the more liquid parts of the blood. It should, then, be our first object to make up this deficiency; and we are consequently led to consider the indication specified above, as one of singular importance.

We cannot quit our subject without remarking the inefficacy of the quarantine regulations, which have been enforced with the view of preventing the extension of this disease. The knowledge of this inefficacy, which the experience of Asia and of Europe has amply proved, will, we hope, prevent the future adoption of measures so injurious to the commercial interests of this maritime country.

The especial prevalence of malignant cholera in the low, crowded, and filthy quarters of towns, and the marked immunity of the quarters inhabited by the wealthy, are, we conceive, circumstances which supply cogent motives for the adoption of every measure calculated to increase the salubrity of the former districts and to improve the health of their inhabitants.

ORGANIC DISEASES OF THE INTESTINES.

Tuberculous Disease of the Intestines.

Tuberculous deposit on the interior surface of the intestines is seldom, if ever, met with in an uncomplicated form. The disease may be said to be always accompanied by pulmonary tubercle, after the age of puberty. M. Louis found the small intestine affected in one third, and the large in one ninth of his cases of phthisis.

Tubercle is deposited principally in the glands of Peyer, and in the isolated follicles. In the first stage, these bodies are only distended with the morbid substance, the mucous membrane above them being perfectly sound; in this state resembling the early period of the follicular lesions of typhus. In the process of ulceration, the mucous membrane is first destroyed, then the tuberculous matter itself, and afterwards the muscular coat, till the base of the ulcer is formed by the peritoneum only.

The symptoms in the first period of the disease may be completely latent, but the subsequent changes generally produce diarrhœa, which harasses the latter days of the phthisical patient. But we have known such ulcerations exist, without any local symptoms of importance. For further details on this subject, the reader is referred to the article, Tuberculous Disease of the Lungs.

Carcinoma of the Intestines.

The portions of the alimentary canal, in which this disease has hitherto been detected are, the œsophagus, the stomach, the duodenum, the commencement of the jejunum, the cæcum, the colon, and the rectum. The most frequent seats are the stomach and the rectum. The anatomical characters of carcinoma in the large intestine differ so little from those of the stomach, that we think it superfluous to describe them. It may be remarked however, that the caliber of the intestine being normally less capacious than of the stomach, the former suffers more from the encroachments of the morbid growth. When the disease attacks the cæcum, there may be very little obstruction: in the sigmoid flexure of the colon we have seen the passage reduced to the size of a quill.

The symptoms are circumscribed pain, of a lancinating character, obstinate constipation, vomiting and tympanites, but they suffer great variation. The pain may be wanting, and if the stricture is not considerable, or if ulceration has taken place, we may find diarrhœa, instead of constipation. The vomiting usually occurs several hours after the principal meal, about the time when the alimentary matters reach the diseased portion of the gut. Sometimes the

paroxysms closely resemble the symptoms of strangulated hernia. The real nature of the case has often been unsuspected during life; but when a hard tumour can be detected in the region either of the cæcum, or of the sigmoid flexure, and the signs of the cancerous cachexia present themselves, there will be less difficulty in the diagnosis. These and other signs, however, are often obscured by ascites, by chronic enteritis, and other complications.

The treatment is altogether palliative. We administer anodynes for the pain, and mild laxatives to ensure such an amount of secretion, that the contents of the bowels may be of a fluid or semi-fluid consistence, and therefore pass more easily. We also endeavour so to regulate the diet that it shall be soluble, compendious, and leave as little excrementitious residue as possible. By attention to these particulars life may be considerably prolonged, and suffering diminished.

Non-malignant Stricture of the Colon.

The most common form of this disease is the indurated and hypertrophied condition of the submucous cellular membrane consequent upon chronic dysentery. We have noticed two other forms not described by authors. In one of them the stricture was situated in the arch of the colon, and appeared to have been caused by a folding inwards of nearly half an inch of the gut, with hypertrophy of the submucous and mucous tissue in this part, but there was no ulceration in this part. The gut was enormously dilated on the cæcal side of the stricture, and adherent to the parietes of the abdomen, and in one part perforated by an ulcer, which communicated with an abscess in the parietes, of considerable extent. It appeared to us that the origin of this disease might have been a small invagination, which became permanent by adhesive inflammation of the peritoneal covering. This view was confirmed by our finding the omentum puckered, or rather plaited in, at the seat of the disease.

In the other case, the stricture was seated just above the termination of the colon in the rectum, and was caused by hypertrophy of the adipose tissue under the serous covering. The passage barely admitted the point of the little finger. Throughout the colon there was a great number of small pouches, appearing at first like round follicular ulcers, but on examination, the mucous membrane was found entire within; they were evidently mere dilatations of those crypts, or cæcal appendages, called by Boehm *glandulæ simplices majores.*

ALVINE CONCRETIONS.

Substances of considerable hardness, and dissimilar to the usual contents of the alimentary canal, have been found in the stomach and intestines after death, and more rarely have been discharged by vomiting or by stool. In the human subject, they are more frequent in the intestines than in the stomach. They consist, for the most part, of the natural secretions of the digestive organs, concrete bile, and tenacious mucus, accumulated and indurated, and intermixed with extraneous substances; such as earthy matters, the husks of seeds, fruit stones, fish bones, &c. The latter bodies are generally nuclei; more rarely they are conglomerated and cemented with mucus. In other cases, they are altogether of an earthy composition; consisting of magnesia, or carbonate of lime, which had been taken in excessive quantities to neutralise acidity in the stomach.

The size of intestinal calculi varies from that of a pea to that of an orange; and the large are of more irregular figure than the small. It is rare to find more than two in the intestines; but Dr. Monro observed twelve in the colon of a boy. When existing in the stomach, their number may be considerable. Lazoni met with ten, and Bilguer with thirty in this organ.

For a very full and precise account of the physical qualities and chemical constitution of these bodies, we refer the reader to Dr. Monro's "Treatise on the Morbid Anatomy of the Gullet, Stomach, and Intestines;" from which we extract the following propositions, embodying the substance of the author's extensive observations on this curious subject:—"1. That the greater number of intestinal concretions consist chiefly of fibres of the beard of the oat, which are intimately matted together, and which, probably have been attracted by a central nucleus. 2. That intestinal concretions occasion a derangement of the functions of the alimentary canal, and create griping, obstinate and long-continued colicky pains, which are generally limited to that part of the intestinal canal which contains the concretion, and which are occasionally more severe upon the patient taking acids or food of difficult digestion. 3. That intestinal concretions may be generally felt within the intestines, and when two or more of these are lodged within the intestines, they may be made to strike against each other. 4 That intestinal concretions frequently change their situation and pass down into the rectum, which is thereby much extended, and, when so situated, occasion acute pain and sense of weight in the back part of the pelvis, with a constant desire to go to stool, which the patient cannot gratify; and they may, by the finger, or by an instrument introduced into the rectum, be felt within it. 5. That intestinal concretions, formed within the human alimentary canal, are, in some cases, discharged by vomiting, or along with the fæces. 6. That an intestinal concretion, after a certain time, cannot be moved from one portion of the alimentary canal to another, owing to its increase in bulk, to the expansion of the coats of that part which contains the concretion into a sac, and to the unnatural constriction immediately below the seat of the alvine concretion. 7. That intestinal concretions must prove a mechanical obstruction to the passage of the aliment through the intestines; and if proper means be not taken to remove the cause of the obstruction, inflammation of the intestines follows, which proves fatal. 8. That, in the earlier stages of the disease, while the concretion may be moved from one part of the intestines to another, all that can be done is to operate on the bowels, partly through the medium of mechanical action, and partly by lubricating the alimentary canal by the exhibition of proper medicines, in order that the concretions may be discharged along with the fæces, or may descend into the rectum, from which it may be artificially extracted. 9. That after the disease has been of long standing, and when a sac has been formed, which retains the concretion in a certain place, it cannot be removed, should it be lodged within the colon, but by an incision, as there is little or no chance of dissolving the stone within the intestine by any medicines given internally."

A vast number of cases are collected in the work of the indefatigable Scheuckins, under the head of *Intestinorum Lapis sive Tartarus.* (*Observ. Med. Rar.*, p. 387.)

Foreign bodies are occasionally pent up in the cæcum, and occasion very serious results. If small enough to become impacted in the *appendix vermiformis,* they almost inevitably give rise to fatal peritonitis. In Cruveilhier's *Anat. Path.*, liv. xxvi. is a case in which an immense accumulation of cherry-stones was found in the cæcum and a part of the colon. Their transmission had been intercepted by a stricture in the latter bowel. During life, the tumour caused by the accumulation gave to the hand a feeling of crepitation like that of emphysema; but it was caused by the friction of the cherry-stones upon each other. It was proved that the fruit must have been eaten a twelvemonth before the decease of the individual.

FATTY DISCHARGES FROM THE INTESTINES.

Of late years attention has been recalled to alvine discharges of a fatty nature, by the researches of Dr. Bright, Dr. Elliotson, and Mr. Lloyd. We have met with persons suffering from functional disorder of the stomach and liver, who frequently passed lumps of matter resembling adipocere. Sometimes the oleaginous matter is discharged in a fluid state; in other cases, it has looked like butter which had been melted and then cooled. The formation of this matter is not understood; nor is there any particular disease, or seat of disease, with which we can pronounce it to be invariably associated. Dr. Bright has related some extremely interesting cases, in which malignant disease of the duodenum and the head of the pancreas coexisted in addition to disease of the liver, and obstruction of the gall-ducts. As hepatic disease and bilious obstruction continually occur without the peculiar discharges under discussion, there can be no essential connection between the former and the latter. Disease of the duodenum alone is often met with unattended by such excretions, and the same may be said of disease of the pancreas; but Dr. Bright seems inclined to think that the combination of the two is somewhat closely connected with the peculiar formation; whether, however, by means of disordered secretion, or of imperfect alimentation, he does not pretend to say.

Dr. Elliotson relates several cases, taken partly from the works of writers in the Ephemerides, of Fabricius Hildanus, Tulpius, and the Edinburgh medical essayists, and partly from his own experience. In one of the latter, the discharge occurred in a patient who laboured under phthisis and diabetes. Dr. Elliotson quotes an instance from the *Annali Universali*, of a man, who having brought on a fit of indigestion by fasting, and afterwards partaken of indigestible food, took to vomiting large quantities of what looked like melted fat. It once amounted to thirty pounds in twenty-four hours. The patient eventually recovered. We are acquainted with a lady who for a long time suffered a great variety of anomalous symptoms, chiefly referrible to the digestive organs, and who frequently discharged an oleaginous matter from the bowels. She is now in good health.

Patients have frequently directed our attention to substances discharged by stool, which they supposed to be peculiar formations, or to have come from internal abscesses, but which, on examination, turned out to be portions of meat; particularly of the cellular and adipose parts, which had not been properly masticated, and having been scarcely at all acted upon by the gastric juice, had created great irritation in their passage through the canal, and finally had been mistaken for morbid products.

We are not acquainted with any specific treatment applicable to cases of fatty discharge from the intestine.

HÆMORRHOIS.

1. *Hæmorrhois.—Simple.—Nature.—Treatment.*—2. *Hæmorrhoidal tumours.—Anatomical varieties.—Mode of production.—Number, size, and appearance.—Symptoms.—Causes.—Treatment.*

This term includes both the hæmorrhage, which occurs at the termination of the rectum, and the tumours on which it frequently depends, but which may exist without causing discharge of blood. We shall speak first of simple hæmorrhage from the rectum, and afterwards of hæmorrhoidal tumours.

1. The most common source of *Simple Hæmorrhois*, is a congestion of the mucous membrane of the rectum, from the capillaries of which, blood is effused

during and after the expulsion of fæces. The congestion may be only a part of the general plethora of the system; but the determining cause of the hæmorrhage is the interruption to the local circulation, caused by the passage of hardened fæces, or by the mere muscular action of expulsion. In other cases, the congestion is entirely local, and may then be occasioned by obstruction of the portal circulation, or by a relaxed and pendulous condition of the mucous membrane, which causes its extrusion during a stool, and a consequent exudation of blood from its surface. The quantity discharged in the latter case is generally trifling. In some instances, simple hæmorrhage is caused by a slight fissure of the mucous or cutaneous surface at the margin of the anus. Such fissures are produced either by large indurated stools, or by psoriasis of the skin; in the latter state the surface may at any time be ruptured by the ordinary action of the sphincter.

A third and frequent cause, though often overlooked, is a small vascular point on the surface of the mucous membrane, from which a minute artery throws a jet of blood every time the bowel is evacuated. This may be unfelt, and the hæmorrhage may occur daily, unknown to the patient and to his medical adviser, till general anæmia awakens a suspicion of the true nature of the disease.

The remote causes of simple hæmorrhois are so similar to those of hæmorrhoidal tumours that it is unnecessary to enumerate them in this place.

The hæmorrhoidal flux is often felt to be so salutary, that the patient rather hails its appearance, than makes complaint of it. But the affection, when long continued, should never be neglected, however great the relief it may occasion at the time. If it is connected with general plethora, it will be proper to abstract blood from a vein, to restrict the diet, and perhaps to effect a vicarious discharge in the form of an issue. When the portal circulation is congested, saline purgatives, mercurial alteratives, and cupping over the right hypochondrium, may be ordered. In females ceasing to menstruate, cupping over the loins will be found useful.

The passive hæmorrhage, resulting from relaxation of the mucous membrane, must be treated by cold water enemata, astringent lotions, and injections (as of Sulph. of Zinc, and Alum or Acet. of Lead), cold sponging, the cold hip-bath, and support of the anus by means of a spring pad, connected posteriorly with an elastic belt, or when this cannot be procured, by a firm compress, and a well adjusted T bandage. To the bleeding tubercle alluded to above, a small ligature must be applied, or it may be touched with nitrate of silver. But if there is difficulty in accomplishing this, the compression exercised for several hours by a firm bougie may be sufficient to obliterate the vessel.

2. *Hæmorrhoidal tumours*, or *piles*, are often distinguished as *external* and *internal*, according as they project or not beyond the margin of the anus; and *blind* and *bleeding*, according as they are attended or not with hæmorrhage; but we shall endeavour to discriminate them according to their *anatomical characters*.

1. The tumour may consist merely of one or several hæmorrhoidal veins, varicose, more or less thickened, and covered with mucous membrane or skin (according as it is within or just upon the margin of the anus), which covering is felt movable over the elastic swelling beneath. These varicose tumours are often accompanied with thickening of the adjacent tissues, mucous, cellular, and cutaneous.

2. The tumour may comprise one or more cysts filled with coagulated blood. The cysts are, we believe, caused by obliteration of the venous pedicles, the varicose parts remaining distended, though some maintain that the cysts are formed at the expense of the cellular membrane, into which blood or serum has been extravasated.

3. The tumour may be a cellulo-fibrous structure, more or less vascular. A tumour of this kind is generally of long standing, and probably originated in a varicose state of the vein, though the changes of the surrounding tissues have obliterated the traces of the latter.

4. It may resemble a warty excrescence growing at the distance of a line or two, or three fourths of an inch beyond the anal margin. It is either cellulo-fibrous or encysted, and has been formed similarly to the second and third variety described above. The distance of such tumours from the anus is easily explained. The mucous membrane being often prolapsed in hæmorrhoidal affections, carries the tumours away from the margin of the anal opening, and undergoing in time a cutaneous transformation, gives the tumours the appearance of having grown from the part of the skin in which they are observed.

5. Another form is an accidental, erectile tissue, growing from the mucous membrane.

6. The last variety consists of a fold of skin and mucous membrane, the cellular tissue being loose beneath. Tumours of this kind are often numerous; sometimes, indeed, the whole circumference of the anus is so puffed and lax, that the contraction of the sphincter puckers it into a coronet of tumours.

The above varieties may be arranged into three larger groups. In the first, the important anatomical character is dilatation of the veins, with or without alterations of the mucous membrane, skin, and cellular tissue. These alterations depend on the age of the tumour, and the irritation to which it has been subjected. The character of the second group is, the accidental erectile tissue; and of the third, a puckered state of the integuments. These last may be called false hæmorrhoids.

Mode of production and development. When the circulation in the hæmorrhoidal veins has become torpid, a little more determination of blood to the corresponding arteries than usual may cause their distension; or an increase of pressure above may have the same effect. The tumours may then merely project into the gut, or appear at the anal aperture, and subside again shortly; or, what is frequently the case, the swollen part is extruded during an evacuation, and is not withdrawn before the contraction of the sphincter; in consequence of which, the tumour is to a certain extent strangulated, the distension of the vein increased, and the capillaries of the mucous membrane congested. The frequent repetition of this accident leads to the production of a permanent tumour. The dilated extremity of the vein becomes a pouch; inflammation in the cellular and mucous membrane induces adhesions, thickening, and hypertrophy; the communication with the venous branches being in some cases diminished or obliterated, in others remaining entire. These consecutive lesions are still farther promoted by the passage of costive stools, the friction of the tumours in walking, or by pressure in sitting. When the strangulation has been considerable and long continued, the tumour may slough. The varicose tumours may become fluid or shrivelled, and remain indolent for years, or they may be subject, at intervals, to congestion and inflammation.

It is not easy to say what determines the first formation of the erectile tumour. In some cases it appears to consist chiefly of mucous and cellular tissue, highly vascular and hypertrophied; in others, it is formed altogether by hypertrophy of the capillary web of the mucous membrane. It may be safely referred rather to direct local irritation and to active congestion of the arterial extremities, than to remora in the veins. The arteries leading to such tumours have been found of unusual caliber. Dr. Collis gives the following description of such vessels: — "On slitting up the rectum I saw three bloodvessels, each as large as a crowquill, running for some way down the intestine, and then dividing into a number of branches; these vessels ramified very profusely, and each seemed by interweaving of its branches to form one of these tumours. The trunks and branches were covered only by the lining membrane of the intestine." (*Dublin Hosp. Reports*, vol. i. p. 152.)

Number, size, and appearance. The venous hæmorrhoids vary in bulk from that of a pea to a pigeon's egg. When small, we may feel them thickly studding the interior of the gut, nearly as far as the finger can reach. Sometimes a single swelling projects beyond the anus, resembling either a red currant, or a small black grape, according to the degree of compression it suffers from the

sphincter. The erectile or fungoid tumours may be as minute as a pin's head, or as large as a strawberry, which they often resemble in appearance. Sir James Earl describes one that measured nine inches in circumference.

The *symptoms* are for the most part local, consisting of a sense of fulness, itching, throbbing, heat, tenderness, dull or shooting pain, tension, tenesmus, hæmorrhage, and mucous or sero-mucous exudation. The varicose tumours have very little sensibility when first protruded, but when strangulated or inflamed become exquisitely tender. The hæmorrhage is generally from the mucous covering, but, in some cases, it proceeds from a rupture of the vein itself. The latter accident is not, in our opinion, of frequent occurrence; much of the suffering from hæmorrhoids depends on the congested or inflamed state of the adjacent tissues.

The vascular hæmorrhoids vary in sensibility; the chief inconvenience is the hæmorrhage which they occasion, and which is often very profuse.

The false hæmorrhoids are often very distressing: they may become tender, excoriated, fissured, sometimes intolerably itching, and are often attended by, if not productive of, prolapsus of the gut.

The general symptoms are chiefly sympathetic fever, when the local inflammation is severe, or faintness, exhaustion, and nausea from the pain and the hæmorrhage. When the hæmorrhoids interfere with the evacuation of the bowels, the general inconvenience is much aggravated. There are often sympathetic pains in the loins, and in the region of the uterus and bladder; hence micturition is by no means uncommon.

Persons are often subject to what is called an *attack of piles*—that is, the veins are either temporarily distended, or the tumours left by former attacks become enlarged. The hæmorrhage, or sero-mucous discharge, is sometimes a great relief to the whole system, removing congestions of the head, of the lungs, of the stomach, and of the liver, in a remarkable manner; while, on the other hand, the sudden subsidence of the tumours, or the suppression of their discharge, or their non-appearance at the usual period, in spring for instance, may cause the most serious consequences, such as apoplexy, pulmonary hæmorrhage, hematemesis, &c.

Causes. Among the *predisposing* causes of piles may be enumerated general plethora, whether natural or induced by luxurious living; the melancholic temperament, in which the venous circulation is torpid; a varicose habit; abdominal plethora induced by sluggishness of the liver, or deficient excretion from the mucous surface; and obstruction to the venous circulation in the abdomen, caused by occupations in which there is but little play of the abdominal muscles, or by the presence of adipose accumulations, tumours, or the gravid uterus.

2. The *exciting* causes are, the accumulation of fæces in the lower part of the colon, pressing upon the mesenteric veins; the determination of blood to the arteries of the rectum from the operation of drastic cathartics (some accuse aloes particularly), or by sitting upon a damp seat, or by the use of the hip-bath, or pediluvium. The congestion may be sympathetic with, or vicarious of, the menstrual discharge.

Hæmorrhoids are most common in middle and advanced age, and more frequent in women than in men; partly on account of pregnancy, and partly from the obstructions of the catamenia, for which, as we have just remarked, hæmorrhoids are apt to be substituted.

Treatment. The indications are, 1. to remove the cause still in operation; 2. to reduce or remove tumours; 3. to alleviate the local symptoms; and, 4. to prevent the recurrence of the disease.

To the first indication belong general bloodletting, cupping over the sacrum, and laxative medicines. The two first of these are required only when there is general plethora, or great determination to the rectum, consequent upon the suppression of other discharges. The particular use of laxatives is to get rid of accumulations in the colon, and by exciting the secretions in the upper part

the canal of, to set free the portal circulation. Castor oil, to which oil of turpentine may be added, if there is much hæmorrhage, manna, sulphur, and senna, are the most eligible. Electuaries containing Bitartrate of Potash, Sulphur and Confect. Sennæ, are extensively employed in hæmorrhoidal affections. The addition of Pepper, or of the Confect. Pip. Nigri is very useful when there is no active inflammation. It may act by stimulating the torpid vessels of the rectum. We concur with Dr. Burne (*Cyc. of Pr. Med.*) in reprobating the habitual use of warm laxative enemata: they are injurious by relaxing and soliciting blood to the diseased part.

2. The most direct measure for removing the temporary turgescence, is the application of leeches to the anus, but not to the tumours themselves. The relief is considerable at the time, but seldom permanent; and frequent applications absolutely do harm by attracting blood to the rectum. One application, however, accompanied by proper laxatives and the recumbent posture, will often remove the attack.

The tumours have sometimes been punctured with great benefit, but the practice is dangerous, unless a needle only is used. If the tumour feels hard, or doughy, and has a thin covering, and if it is one of the species described above, as thin cysts containing coagula, it is very desirable to evacuate the contents. When the hæmorrhoids are permanent tumours, the mode of treatment becomes a surgical question. We have known great benefit from the assiduous use of Ung. Hydr. Nitr. properly diluted. But in many cases their extirpation is called for, if it can be practised with safety. The choice of the ligature or the knife is often a matter of nicety. When the piles are quite beyond the verge of the anus, the excision is preferred. The erectile tumours are best managed by ligatures, but the varicose are the most difficult to deal with. Excision often endangers the patient by hæmorrhage. When there is but little bleeding we may be sure that the venous peduncle was all but obliterated, but it is nearly impossible to ascertain this with certainty *à priori*. On the other hand the ligature may produce phlebitis, peritonitis, or severe disturbance of the nervous system. Where there is much doubt we should prefer the use of palliatives to making any attempt at extirpation. For more particular information on these points. however, we must refer to works on Surgery, particularly to Sir B. Brodie's Lectures. (*Med. Gaz.* vol. xv.)

3. For the relief of local uneasiness, tenesmus, itching, &c. we may direct the use of warm or tepid fomentations, a sponge dipped in an aqueous solution of opium, or henbane, or in poppy decoction, and tepid lotions of acetate of lead. The application of steam by sitting over hot water is a favourite popular remedy, but should not be very often resorted to. Ointments made by rubbing down lard with Liq. Plumb. and Liq. Op. Sed. or Extr. of Henbane, are soothing applications. In chronic cases astringent ointments, as Ung. Gall. and Ung. Zinc., lotions of Sulph. Zinc., Inf. Gall. and Dec. Querc., do good by diminishing the relaxation of the surrounding tissues.

4. The preventive treatment consists in attending to diet, in maintaining the action of the bowels, in taking regular exercise, in avoiding causes of irritation, and in giving tone to the circulation in the rectum. The last of these objects may be attained by sponging with cold salt water night and morning, and the use of a cold water enema just after a stool. Where there is much relaxation of the anus, with tendency to prolapsus, pressure is most advantageous, even though tumours exist; indeed, we have known tumours disappear under the employment of it, either by a spring pad or by a bandage, as recommended under the treatment of simple hæmorrhois. A bougie is sometimes useful on the same principle. Whether horse exercise acts in this manner, or by putting the perinæal integuments on the stretch, we do not presume to determine; but its utility is unquestionable.

Lastly, we must remark that no affections are more commonly mistreated than hæmorrhoids, in consequence of resorting at once to empirical methods,

instead of first investigating the pathology of the individual case. This error is sometimes due to the carelessness of the practitioner in treating in an off-hand manner a very common, and often trivial complaint, but not unfrequently the fault lies more in the reserve and bashfulness of the patient.

SPASMODIC STRICTURE OF THE RECTUM.

Symptoms.—Causes.—Diagnosis.—Treatment.

In this complaint the patient suffers from constipation, and extreme difficulty in passing the evacuations. The stools are sometimes in the form of small cylinders, sometimes flattened like tape, and at other times consist of small nodules or pellets. Just before and during defæcation, there is often a sense of constriction in the lower part of the abdomen. The patient's feelings give the impression of some mechanical obstacle, which is confirmed by the appearance of the stools. These symptoms may continue for years, without improvement, or with short intervals of amendment, and then subside spontaneously. It is most important to diagnosticate such cases from those in which there is a permanent stricture, whether from inflammatory thickening of the submucous tissue, or from carcinomatous deposit. The symptoms are in many respects identical, but the appropriate treatment is very different.

Spasmodic stricture affects persons of the neurotic diathesis, particularly those subject to hysteria, hypochondriasis, and dyspepsia. The exciting causes are sometimes in the bowels themselves, particularly deficiency or vitiation of the bilious and mucous secretions. Irritation of the mucous membrane, whether inflammatory or nervous, may have the same effect. But frequently the disorder is only a part of a general deranged state of the nervous functions, and alternates with neurotic affections in other parts, or is provoked by causes acting directly on the nervous system, more especially by mental emotions.

The spasm or irregular contraction of the muscular fibres is caused either by a change in its natural stimulus (the feculent matter), or by a disturbance of the nervous apparatus which regulates the contraction. In some cases the extremities of the nerves are unduly irritable, as when the mucous membrane is inflamed, or even without this complication. In others the spinal marrow appears to be the seat of an irritation which disturbs the reflex function. The pathology of this affection is analogous to that of spasm of the bladder, and of the œsophagus, and often co-exists, or alternates with these disorders.

The *diagnosis* can sometimes be determined by an examination; thus a bougie may pass up to the sigmoid flexure without any impediment, though unfortunately this is not always the case, the foreign body provoking the contraction which it seems to detect. We must then rely on the habit of the patient, the diseases which have previously existed, the age, the general health, and a careful examination of the stools.

Thus *permanent* stricture is very uncommon before the decline of life, or at all events before middle age, and, when of a carcinomatous nature, is accompanied by marked signs in the complexion and general health,—and generally by lancinating pains, and discharge from the part; whereas spasmodic stricture occurs at any time after puberty, and without any appearance of cachexia. The patient in the latter complaint, if a female, has had amenorrhœa, or menorrhagia, or suffers from globus hystericus, palpitation, hysterical vomiting, dysuria, &c. &c. or if of the other sex, he has been what is called "a martyr to indigestion," and is over-attentive to all his bodily ailments. If we can obtain a sight of the evacuations, when the patient's attention has been diverted from the alvine function by some new and more urgent distress, we shall often discover that scybala have been voided of sufficient bulk to enable us to dis-

miss the apprehension of mechanical impediment; notwithstanding the patients or the attendants may assure us that there is not room for a bougie of the size of a goose-quill. In many cases we can only ascertain the true nature of the affection, by putting a number of slight circumstances together, and viewing their aggregate evidence against the one view or the other.

The *treatment* of spasmodic stricture consists, first, in preventing irritation from the contents of the bowels, by the use of a mild unoffending diet, and of alterative and laxative medicines: 2dly, in diminishing the spasm by anodynes and nervines, such as opiate and fetid enemata; 3dly, in imparting tone to the bowel by cold injections, cold affusion over the loins, and the cold hip-bath; 4thly, in removing spinal irritation by leeches in small numbers, by blisters, rubefacient liniments, or frictions with croton oil; 5thly, in diminishing the general susceptibility by tonics (particularly chalybeates, which may be combined with aperients), by the shower-bath, and regular exercise in the open air; 6thly, in attending to the catamenial function; and lastly, in procuring regular occupation, especially such as may divert the mind from the local ailment. A strong moral impression will sometimes supersede every other agent. We shall relate an instance of this, which fell under our own notice. Our opinion was requested upon the treatment of a young lady, who was considered by her relatives and herself to be afflicted with an incurable stricture of the rectum, and who had been under medical care in another part of the country. She was of a highly excitable temperament; her age was twenty, and she had been ill for more than a twelvemonth. Her malady, in the first instance, had been treated as if dependent on a chronically inflamed, and then obstinately torpid and congested liver. The remedial measures employed were venesection, cupping over the hypochondrium, leeching, blistering, and mercurial salivation; notwithstanding all which, the young lady became worse rather than better. It was then suspected that some mischief existed in the rectum; and to ascertain this fact a female, supposed to be experienced in such matters, was directed to make an examination, and, upon her report, the case was pronounced to be organic stricture. The regular use of the bougie was now recommended, but no rectum-bougie could be made to pass the stricture; whereupon some moderate sized urethra-bougies were used, but with great pain and difficulty. These were shown to us as proofs of the mechanical obstacle; and we furthermore learned that the young lady often suffered from palpitation, headachs, and breathlessness, for which it had been advised that she should be occasionally bled, by way of equalising the circulation, while the liver was to be kept up to its duty by occasional doses of calomel. The bowels were opened by enemata.

After a careful examination of the case we stated our inability to discover proofs of any thing but aggravated hysteria. We advised the bougies to be laid aside, much to the astonishment and doubt of the relatives, and to the relief of the patient, who had suffered greatly from their introduction; and we advised the use of tonics, sedatives, laxatives, and a bracing regimen. The patient was gradually improving, with occasional fluctuations (in the course of which we had an opportunity of observing, more than once, that a rectum through which such evacuations could pass, as were submitted to our notice, was quite capacious enough for its ordinary function), when the cure was suddenly taken out of our hands. We called one morning as usual, and instead of finding the young lady stretched upon the couch, afflicted with tremors, palpitation, throbbing pains, and a thousand other ills, we saw her advance to meet us with all the appearance of a person in health. She informed us that, on the previous evening, she had had a long and interesting conversation with a gentleman who had recently arrived from the metropolis, where he had witnessed some astonishing effects of miraculous agency in the removal of incurable maladies; and that he had encouraged her to expect a similar display of supernatural power in her own case. She lay awake a great part of the night meditating upon what she had heard, and in the morn-

ing assured her mother that she could leave her bed without help, and that she was quite restored. From that time she was perfectly independent of medical aid till some months afterwards, when the hysteria appeared in a different form. The cure of the case might be explained in two ways; either by supposing that the powerful impression upon her mind had subverted the morbid condition of the nervous system, of which we may see examples almost every day; or that the evils had been principally simulated; and that a convenient opportunity was chosen for resuming the aspect of health. From our knowledge of the patient's character we entertain the former opinion.

In Mr. Mayo's *Outlines of Pathology* there is a very instructive case related by the patient himself,—a physician. He got rid of his complaint after long years of suffering, by abstaining from purgatives and using a restricted diet.

COLIC.

Symptoms.—Anatomical characters.—Nature.—Varieties.—Prognosis.—Treatment.

As there are no fixed anatomical characters of this disease, we shall speak, first of the symptoms, and afterwards of the pathological states, with which they have been observed or supposed to be connected.

Pain of the belly, especially about the umbilicus, of a twisting character, occurring in paroxysms, and generally relieved by pressure; constipation; and often nausea and vomiting, are the early symptoms. They may subside after the use of a strong purgative, or increase in severity. The pain then becomes more fixed, and is aggravated by pressure; the constipation continues; and the vomiting is so urgent that even the contents of the intestines are forced into the stomach and discharged by the mouth. Hiccough, prostration, and cold sweats belong to this group of symptoms, which are distinguished by the term *Ileus* or *Ileac Passion.*

The pulse at the commencement of the attack is generally slow or of natural frequency, but it may become accelerated in the progress of the disease, and is then accompanied by febrile heat. This however depends chiefly on the fact of its being complicated or not with inflammation. The abdominal parietes are in some cases rigidly contracted, in others distended, and in others again gathered up into knots, so as to give (in the words of Cullen), "the appearance of a bag of round balls."

The duration of the disease may extend from a day or two, to two or even three weeks.

Anatomical characters. Persons seldom die in mere *colic*, so that the actual condition of the bowel is a matter of inference only. The morbid appearances of *Ileus* may be arranged under two heads, 1. lesions with mechanical obstruction; 2. lesions without mechanical obstruction.

1. In the first category may be placed, (*a*) Contraction of the bowel from former disease of its parietes.—(*b*) The stoppage caused by a large gall-stone or intestinal concretion, impacted in the small intestine.—(*c*) Intus-susception, or invagination, that is, the reception of one part of the intestine into the other, in such a manner that, on examining the part from within outwards, we find first two serous, and then two mucous surfaces in contact, and three concentric cylinders. This change is owing to a derangement of the regular peristaltic action, by which one part of the canal remains dilated, while that immediately above contracts, and by its propulsive movement is forced into the expanded portion. This state would not be attended with serious inconvenience, but for the spasmodic constriction of the recipient intestine, which strangulates that which is contained.—(*d*) Internal hernia, caused by entanglement of the intestine in preternatural openings of the diaphragm, the omentum, or the mesentery;

by bands of false membrane between the intestine and other viscera, or partial adhesions of convolutions forming loops, in which other convolutions may be ensnared; by a preternatural length of the vermiform appendage of the cæcum, which becomes twisted round a portion of the ileum, and adherent by what is usually its free extremity; or by a preternatural appendage to the ileum itself, called *diverticulum ilei*, of which we possess a remarkable specimen taken from a boy whose death it occasioned by entangling several inches of ileum in a tight knot.—(*e*) The pressure of a tumour external to the intestine, of which we have observed two instances; one a tuberculous accretion in the omentum, the other a fibrous tumour of the uterus.

2. The second class comprehends a great variety of cases. The most numerous of which are those, in which a portion of the intestine is distended and inflamed, the inflamed part being of a dark red colour, or quite gangrenous, with or without exudations of coagulable lymph, according as the inflammation has extended to the peritoneum, or been confined to the muscular coat. The appearances in such cases bear a close resemblance to those of common hernia, when the bowel, though liberated, has not recovered the injury it received from the compression. They are sometimes found in connection with old adhesions, which however may not have caused any direct mechanical impediment, but only interfered in some manner with the regular action of the canal. We confess that in all the cases of this group, there is great obscurity as to the production of the mischief; as it is not easy to understand the beginning of the inflammation in the muscular coat, a structure by no means liable to spontaneous disease of this kind, while the appearances are more like those of congestion from some impediment to the return of blood from the part. So much is this the case, that were it not for the great extent of the diseased portion in some instances, we should surmise that a temporary cause of strangulation had existed, such as an invagination which had been spontaneously reduced. But in another set of cases, wrapped in still deeper obscurity, the only morbid appearance has been an unusual degree of distension in some part of the tract. Such cases have not fallen under our own observation, but Dr. Abercrombie has related the particulars of two. One of them was a young woman who died after an illness of nine days, presenting the usual symptoms of ileus. The following is an account of the inspection:—" The whole of the colon, and about twelve inches of the lower extremity of the ileum were empty, contracted, of a white colour, and seemed perfectly healthy. The remainder of the small intestine was distended to the greatest degree, so as to appear thin and transparent; its contents were chiefly watery matter and air. On the surface of the distended intestine there was on several places, especially at the lower part, near the contracted portion, a superficial blush of vivid redness, but without any appearance of exudation. There was a small abscess in the left ovarium. All the other parts were healthy. (*Diseases of the Stomach, &c.* p. 110.)

We conclude our account of the morbid appearances in ileus, by remarking that in many cases portions of the intestine present a cord-like contraction, just below the inflamed and distended part.

Nature. In all cases of ileus the propulsion of the intestinal matters is obstructed. In some, as we have seen, the obstacle is of a mechanical nature, and about these there can be no difference of opinion. But, as in others the passage of the canal is observed after death to be quite free, it is obvious that the obstruction must have been caused by some derangement or deficiency in the action of the muscular coat of the intestine. Upon the nature of this disorder two opinions are maintained. According to one, the intestine contracts spasmodically in some part so as to resist the passage of the contents, while the other supposes simply a loss of muscular power in some part of the canal, which prevents it from taking a share in the propulsive action. The former is the more prevalent belief, and is grounded upon the character of the symptoms, and the exciting causes, as well as upon the nature of the remedies. Dr. Abercrombie was the first to broach, and is the principal advocate of the other

opinion, which appears to have been inferred from a consideration of certain peculiar cases already alluded to. He regards the notion of spasm as altogether gratuitous, and sees no necessity for looking further than that condition of the diseased part which is found after death. He admits however, "that there may be irregular contractions of portions of the intestine, analogous to that to which the term spasm is usually applied, and that these may form the first step in that chain of derangements of the harmonious action of the canal which leads to an attack of ileus." He then adds, "the observations now made strictly apply to the condition of the parts in the fully formed or advanced state of the disease."

Upon two points we concur with this distinguished author:—1. That the diseased part of the canal is paralysed, and that upon this depended the obstruction in the latter stage of the illness. 2. That the contraction of the gut does not necessarily indicate disease; for we believe it to be owing to the smaller quantity of gas contained in the part, the principal accumulation of air being in the part where least resistance was offered, viz. that which had lost its contractility. But we submit that the error in Dr. Abercrombie's theory is laying an undue stress upon what appears to be only the termination of the disease. The true pathology of fatal ileus must, in our judgment, embrace both spasm and paralysis. The reasons for inferring the former have been already alluded to, to which we may add the signs of inflammation in many of the cases, for it would be contrary to all analogy to suppose that inflammation attacks the muscular fibres, or even their contiguous tissues, without producing spasm. We see this accompaniment in rheumatism generally, in the intercostal muscles, in pleuritis, and in the diaphragm in pericarditis. But muscles which have been thrown into spasm by inflammation, in the progress of the disease become paralysed, of which we have also proofs in the instances just adduced. As to the cases which present no appearance of inflammation, we cannot doubt that spasm existed at the commencement of the attack, though in its progress the contractility was destroyed.

Varieties. Several forms have been distinguished by nosologists, but we do not think it worth while to notice more than the following:—1. Spasmodic colic, which is common in hysterical, dyspeptic, and gouty subjects. This is often accompanied by flatulence, and tympanites, and may be brought on by mental agitation, or by cold applied to the extremities. 2. Colic from crudities or from scybala, including the *C. accidentalis* and *C. stercorea* of Cullen, and the *Colique végétale* of French authors. 3. Lead colic, which will receive a separate consideration. 4. Inflammatory colic, or muscular enteritis. 5. Colic from mechanical obstruction.

The *prognosis* will depend mainly upon the opinion formed of the cause of the attack. If it can be traced to acrid ingesta, neglect of the bowels, mental agitation, &c. and if it is soon followed up by appropriate remedies a favourable issue may be expected. But if no such causes can be ascertained, if the constipation continues notwithstanding the use of active medicines, and especially if the vomiting becomes stercoraceous, the case is one of extreme danger. Hiccough, tympanites, coldness of the surface, and a small rapid pulse, are among the most alarming symptoms. But patients sometimes recover from the most apparently hopeless forms of ileus. Dr. Kidd once informed us of a case, in which stercoraceous vomiting continued fourteen days, and yet the patient was restored. Sometimes a fortunate termination is owing to sloughing of the invaginated intestine, which is discharged by stool. Dr. W. Thompson of Edinburgh has collected and analysed a great number of these cases. (*Ed. Med. Jour.* for 1835 and 1837.) Dr. Howell of Clifton has in his possession a portion of the ileum eighteen inches in length, with the mesentery attached to it, which had been evacuated in this manner. The patient died a year afterwards of another disease. The greatest length of discharged gut on record is forty inches.

Treatment. In the milder forms of colic, the best remedies are aperients combined with carminatives, antispasmodics, and sedatives. A dose of calomel,

camphor, and extract of henbane, followed speedily by a draught composed of Dec. Aloes C., Inf. Senn. and Tinct. Jalap. or of other stimulating laxatives, will often put an end to the attack. The effect of such medicines may be aided by warm fomentations and large enemata. If the subject is strong or plethoric, a bleeding from the arm will be a safe precaution against inflammation, and an excellent auxiliary to the antispasmodic and aperient measures. In cases complicated with hysteria, an assafœtida or turpentine injection should be resorted to. In all forms of the disease, when the pulse becomes quickened, or when tenderness is felt upon pressure, the constipation having lasted several hours, it will be expedient to abstract blood. Local depletion by leeches is often preferable to venesection.

In cases presenting at first the characters of simple colic, but passing into ileus, or assuming the severe form from the commencement, particularly in the violence of the tormina and the vomiting, we must first ascertain that external hernia is not present. The management of this form of the disease is often very difficult, and will put in requisition all the resources and ingenuity of the practitioner. It is often manifest from the tormina, that the alimentary tube is making violent propulsive efforts, but that the impediment is too great to be thus overcome. In such cases it is questionable whether much good is to be attained by the use of purgatives; and they certainly aggravate the sufferings of the patient. The indication is to remove the impediment, for which purpose antispasmodics are sometimes the most efficient means. The cases in which purgatives are most indicated are those produced by acrid ingesta or fecalent accumulations. Now as it cannot always be determined absolutely that such causes have not been in operation, we usually administer at the onset one active cathartic, and if it fails to remove the constipation we no longer attempt at this stage to force the passage, but take measures for reducing the spasmodic contraction, whether this be the principal cause or only an accompaniment of the obstruction. Calomel, in the dose of ten grains or a scruple, is an eligible medicine, because it often allays the vomiting. If the sickness is not very urgent we may administer a full dose of croton oil, two drops for instance in a pill. Soon after such a dose a large emollient clyster should be employed. If no satisfactory evacuation ensues, blood must be taken from the arm, with the view not only of combating what inflammation may exist, but also to induce that general relaxation which favours the operation of the medicine. A full dose of opium given after the bleeding will, in many cases, promote the natural action of the bowels by allaying the tormina.

A warm bath may be used at this juncture with very good effect. If the case continues obstinate, our next resource must be an injection of tobacco. This powerful medicine requires great caution in the administration. The plan recommended by Dr. Abercrombie is the safest and most efficient; it consists in *infusing* fifteen grains for ten minutes, in six ounces of boiling water, and injecting this infusion every hour till the characteristic effects of slight giddiness, faintness, and muscular relaxation are induced. The dose may sometimes be increased to twenty grains. The same physician has seen very good results from a small enema, containing two grains of tartar-emetic, given with the same view as the tobacco. Some practitioners are partial to the use of tobacco in the form of vapour. Others place their main reliance upon enemata, containing large quantities of Ol. Tereb. When copious enemata are used, it is better to pass a long tube into the sigmoid flexure of the colon, as there will be a much better chance of having the fluid retained a sufficient space of time for its proper action. Considerable quantities of warm water may be thrown up in this manner with very decided effect. There can be little doubt that the distension thus produced is the chief agent in the beneficial operation. One can imagine that even an intus-susception might be unfolded by powerful distension of the lower part of the canal. On this principle may be explained the good effects which have been obtained from inflation of the colon by means of a tube affixed to a bellows.

Although we have not recommended the use of strong purgatives after the failure of an efficient dose at the commencement, we can add our testimony to that of Dr. Abercrombie in favour of gentle laxatives frequently repeated, especially of aloes and hyoscyamus. Small doses of Magn. Sulph. in Inf. Ros. may be given in the same manner. Linseed oil has been recommended in doses of half an ounce every hour or two, combined with a few drops of Ol. Anisi. In few cases we apprehend is the stomach likely to retain such a potion.

Affusions of cold water upon the abdomen have sometimes produced an immediate good effect. Crude mercury, or small shot, swallowed to the amount of two or three pounds, has in many cases been followed by a solution of the disease, but we have ourselves no experience of these remedies. Dr. Abercrombie speaks highly of large blisters applied to the abdomen; while Dr. Copland prefers hot turpentine fomentation. The best method of employing the latter is that of wringing a flannel out in hot water and then sprinkling it with oil of turpentine.

In the advanced stage of the disease, when there is great prostration, wine and other stimulants should be freely exhibited. Vinum aloes may be chosen for its twofold operation. We think highly of the administration, under the same circumstances, of injections of quinine, to which a small opiate may be added. The principal use of such means is to gain time while a spontaneous process of cure is going on.

In no case is treatment to be abandoned in despair; but when the constipation continues in spite of the measures which have been enumerated, more good is to be expected from the use of small doses of mercury than from any other remedy with which we are acquainted; very protracted cases have begun to amend after this medicine had produced its characteristic effects upon the system. It is probable that in such instances the impediment was caused by thickening from inflammatory deposit.

In intusception the abdomen has been incised, and the strangulation reduced by the finger, with a successful result. Before deciding upon so formidable an operation, there must be more certainty in the diagnosis than can usually be obtained. Dr. Copland gives the following summary of the diagnostic marks of this condition:—"The sudden invasion of the symptoms of severe colic or ileus after a violent straining at stool, and subsequently the constant desire to go to stool, attempts at evacuation being accompanied with violent tormina and tenesmus, and either unattended by evacuation, or followed by the discharge of a little bloody mucus, and these by symptoms of enteritis, are amongst the most constant concomitants of invagination. In some instances, also, the sudden occurrence of an elongated tumour, in addition to these symptoms, and before abdominal distension comes on, will further guide the opinion, particularly if the invagination be extensive, and seated in the cæcum or course of the colon."

We remember a case in which all these signs were present, but which after lasting several days gave way to the operation of a strong dose of croton oil, administered as a *dernier resort.*

LEAD COLIC.

Symptoms.—Nature.—Treatment.

This form of colic is otherwise designated as *Colica Pictorum* or *Painters' Colic*, and *Devonshire Colic*, because workmen of this class are particularly liable to it. The disease having once prevailed extensively in Poitou, it has been called *Colica Pictonum*, just as in this country it has been known as Devonshire colic.

In both these localities the disease was owing to the impregnation of wine and cider with lead, either purposely to correct their acidity, or accidentally by the use of leaden vessels. The lead colic is well known among plumbers, lead-miners, glaziers, potters, and manufacturers of white lead, &c. It is probable that the lead enters the system chiefly by pulmonary absorption, but not entirely, since it has been observed that workmen who are careful to change their clothes, and practise frequent ablutions, are much more free than others from the deleterious effects of their occupation. The disease may be caused by water which has been kept in leaden cisterns, or which has passed through pipes of this metal; but for the water to be impregnated by the metal it must be deficient in certain salts, particularly the sulphates and phosphates, which exert a protective action, by forming insoluble compounds between their acids and the oxide of lead. (See *Christison on Poisons, and Taylor in Guy's Hosp. Rep.*, No. vi.)

Symptoms. Many of the symptoms are common to this with other forms of colic; but it has certain distinguishing characters. Thus the pain begins less abruptly, being at first dull, and afterwards increasing in intensity, and it generally extends to the back and the hypochondria. We may often at once form a suspicion of the nature of the disease, by observing the tremulousness of the hands, and the weakness of the carpal joint, called by workmen the *wrist drop.* The patient generally suffers pains in the limbs as well as in the abdomen, and not unfrequently spasms of the respiratory muscles. The tongue is usually flat, tremulous, and flabby, and the face of a dingy hue, with a dejected or anxious expression; some have observed even a yellowish tint. Dr. Burton has lately drawn attention to the appearance of the gums, which are of a pale bluish-grey colour, especially along their margin. The abdominal parietes are in some cases tender, while in others the patients find considerable relief in the pressure of heavy weights. There is great variability, also, as to the abdominal muscles; for the most part they are retracted about the umbilicus, but we have often seen them distended. The stools when produced are at first hard, dry, and knotty. Instead of constipation, diarrhœa has been observed; but this is extremely rare. The sphincter ani is sometimes so obstinately closed as to prevent the introduction of a clyster pipe. Fever is not a prominent symptom, and is sometimes entirely absent, but we have very often found the pulse quick and hard, and the skin hot.

The attack is sometimes accompanied by palpitation, and sensations like those of *angina pectoris*, sometimes by severe headach, and frequently by pain shooting along the course of the genito-crural nerve.

The disease is seldom fatal of itself. Thus Andral states that out of 500 cases observed at the hospital "La Charité," only five were fatal. (*Pathol. Interne*, t. i. p. 158.) But the patient, if the same pernicious cause is in operation, may die eventually of apoplexy or epilepsy. Partial palsy, impairment of digestion, atrophy of the muscles, and a debilitated condition of the whole system, are some of the most common consequences.

Nature. Anatomy has as yet given little more than negative information as to the pathology or nature of lead colic. Andral relates five cases (*Clin. Méd.*, t. iv. p. 486.), in which no lesions could be detected in the intestines capable of explaining the symptoms. Louis observed a similar absence of morbid appearances, in one of the cases narrated in his memoir on sudden and unexpected deaths. (*Récherches, Anat. Path.*, p. 483.) The mucous membrane has been found unusually dry, corresponding to the character of the stools, but, excepting this, there is no appearance that bears any relation to the symptoms. The prevalent opinion in the present day is that the disease is of a neuralgic nature. The wandering pains, and impaired action of the voluntary muscles, the occasional spasm of the organs of respiration, and the termination of the disease in convulsions, apoplexy, and palsy, intimate that the poison acts directly upon the nervous system, and more especially on the spinal marrow. There is an evident analogy between the state of the intestine and that of the

muscles, for in both we observe pain, together with spasmodic or deficient contraction.

The *treatment* is in most respects similar to that of the other species of colic. The chief indications are to relieve the pain and to procure a free action of the bowels. An opiate may be administered at the commencement, combined with calomel in a full dose; after which we must put in force many of the measures recommended in the last section, particularly the warm bath, turpentine or tobacco enemata, and the administration of croton and castor oil. There is not the same objection to beginning at once with strong cathartics as in some forms of ileus. The treatment pursued at La Charité is emetico-purgative; but though it appears to have been very successful, the plan usually adopted in this country of combining anodynes with the aperient remedies is preferable, because, while it is, to say the least, equal in efficiency to the other, it is attended with much less suffering.

Bleeding from the arm is very seldom requisite, but we often direct leeches to be applied, with great relief to the feeling, if not with any curative effect. We have observed the symptoms, though previously obstinate, give way under the specific action of mercury, but it will not be often needful to resort to this measure if other remedies are applied with sufficient promptitude. Sulphate of alumina in scruple doses is highly spoken of by some authors, but we have no experience of its virtues in this disease.

TORPOR OF THE COLON.

Nature. — Causes. — Symptoms. — Treatment.

The state of the colon to which this term is applied, is one of deficient contractile power, by reason of which the fæcal matters are detained and accumulated in the bowels. It is one of the most common forms of habitual constipation; but the mode of its production varies considerably.

In some persons this weakness of the colon is only a part of the asthenic condition of the whole system, such for instance as we meet with in persons exhausted by hæmorrhage, in aged subjects, and in chlorotic or leucorrhœal females. In others the deficient contraction depends upon causes more local in their operation. Thus it occurs very frequently in persons who, notwithstanding their indolent or luxurious habits, continue to consume the ordinary amount of food, and it may in such cases be traced to the accumulation which takes place in the bowel, from the want of that degree of support and compression which it is intended to receive from the abdominal muscles during bodily exercise. The colon like other hollow viscera becomes weakened by the long continuance of a distension disproportionate to its natural power. The indigestible nature of the food is another cause; for not having been reduced to a condition adapted to the natural irritability of the great intestine, it may either stimulate this part to unnatural hasty contractions, as in one of the forms of diarrhœa already described, or, what more commonly happens, it may produce no contraction at all. In the latter case the accumulation occurs principally in the caput cæcum. This form of constipation is often met with, as the consequence of eating large quantities of fruit and vegetables. But in another class of cases the fault is not so much in the food itself as in the processes to which it has been subjected in the upper parts of the tube. The insufficient chymifaction in gastritis and dyspepsia, the imperfect action of the duodenum, the deficiency or bad quality of the bile, will readily explain why the contents of the small intestine do not stimulate the colon to healthy action. But whether the fault lies in the quality of the food or in the digestive pro-

cesses, the result is much the same. The feculent matter accumulates in the colon, because the latter is not duly excited to contraction; while the fibres lose their power, both from inaction, and from the distension to which they are subjected.

Torpor of the colon is sometimes connected with spinal irritation, but the influence of the latter is probably indirect through the intervention of the rectum, the spasmodic contraction of which occasions the retention of the contents of the colon. In many cases we believe the spinal disorder to be consequent rather than antecedent. When the medulla spinalis is paralysed, the colon is very often involved in the paralysis.

Symptoms. Constipation is the most prominent of the local signs, but to this we may add tympanites, borborygmi, and stridulous sounds. The appetite is defective or perverted, and the digestion in most cases tardy and accompanied with uneasy sensations. The tongue is generally pale, sodden, puffed, and indented along its margin, the breath fetid, the skin damp and chilly, the urine turbid and dull, the complexion pasty or of a dingy hue, the areolæ round the eyelids dark, and the expression of the countenance oppressed or anxious. There are sympathetic pains in the head and loins, but especially in the latter, and to such a degree as to simulate lumbago or nephralgia, aching sensations in the limbs, shooting pains in the region of the bladder and genital organs, palpitation and dyspnœa.

The evil consequences in other parts of the system are manifold. If the torpor of the colon is primary, it can scarcely fail for very obvious reasons to involve disturbance of the stomach and duodenum. The accumulations may be mechanically injurious; thus by making pressure on the biliary duct, they may occasion jaundice; and in like manner by compressing the mesenteric veins they produce hæmorrhoids. It has been thought by some that apoplexy may result from their pressure upon the abdominal aorta; and there can be little doubt that the œdema of the feet in young women suffering from this affection, may be sometimes accounted for by the impeded circulation in the inferior vena cava. The disease is often connected with amenorrhœa, but whether in the relation of cause, or as an associated effect of an antecedent common to both, is not quite evident.

The prognosis is by no means unfavourable when the disease is fully ascertained but this is often more easy to cure than to recognise.

Treatment. The first indication is to disburthen the colon of accumulations already formed. For this purpose we may use conjointly cathartics by the mouth, and enemata. The latter may consist of thin gruel, with castor oil and oil of turpentine; or of Epsom salts dissolved in infusion of senna, in the proportion of one or two ounces of the former to half a pint of the latter, to which a pint of warm water should be added. In obstinate cases, the enema colocynthidis is a good resource. When the injections return without bringing scybala with them, we have directed the injection of a large quantity of warm water through a long tube passed into the sigmoid flexure of the colon, in the manner recommended by Dr. O'Beirne. (*New Views of Defæcation, &c.*)

The purgative medicines which we have found most efficient in these cases, are Dec. Aloes Comp., with Inf. Senn. and Tr. Jalap.: the Pil. Cambog. Co.; or equal parts of this pill and Ext. Col. Co.; or of the latter and Pil. Rh. Co.; taken twice daily. We may remark that when these combinations fail to produce any effect, which is not a very unfrequent occurrence, there is reason to suspect that the drugs are of bad quality. The purgatives should be continued till the motions are of a natural appearance and devoid of scybala.

2. We must next endeavour to remove or counteract those causes which have rendered the contents of the intestine less stimulating than they ought to be, whether in the food or in the imperfect functions of the stomach and duodenum. (See the treatment of DYSPEPSIA and DISORDERS OF THE DUODENUM.)

3. The third indication is to restore the tone of the colon. With this view we may exhibit laxative and tonic medicines in conjunction: for examples, a

grain of quinine or of sulphate of iron with four of Pil. Alo. c. Myrrh twice or thrice daily; or the quinine may be given in solution with Magn. Sulph. in cinnamon water. We have found electuaries containing tartrate of iron very serviceable. Friction of the abdomen with liniments composed of camphor and turpentine, or with a flesh brush, or a flannel glove, after sponging with salt water, is an excellent auxiliary. Tepid or cold affusion of the loins, followed by brisk friction, is also useful. If there is spinal irritation, leeches or blisters must be applied over the lumbar vertebræ.

4. The diet must be such as will leave the smallest possible quantity of excrementitious product. Animal food may be used twice daily in most cases; but fruits, vegetables, preserves, *et id genus omne*, must be rigidly abstained from. Wine may be allowed as a part of the tonic regimen which this affection usually requires. Exercise either on foot or on horseback is indispensable. In addition to the local application of cold, already recommended, the use of the shower bath will be expedient.

TYMPANITES.

Nature. — Complications. — Diagnosis. — Symptomatic tympanites. — Duration. — Treatment.

Distension of the abdominal parietes by a large collection of air in the interior is called tympanites, or meteorismus. The latter term is restricted by some writers to the symptomatic form of the disease, particularly that which occurs in fevers. Cullen and other nosologists distinguish tympanites as caused by accumulation of air in the intestine (*T. intestinalis*) from that form in which the air is contained in the peritoneal sac (*T. abdominalis*). But the latter is allowed by all observers to be extremely rare, excepting as the consequence of perforation of the intestine, or of disorganisation of the peritoneum.

Intestinal tympanites is very common, both as an acute and as a chronic affection. The acute form is generally an accompaniment of other diseases, the chief of which are peritonitis, colic, and typhoid fever. We have known it take the place of an autumnal diarrhœa. Chronic tympanites, though frequently an attendant on other diseases, especially peritonitis, may be the only complaint of its subject, and in this form it has been mistaken for many other species of abdominal intumescence, including the gravid uterus.

Diagnosis. Tympanites may be distinguished from solid or liquid distension by the clear resonance which percussion elicits. It may be further distinguished from ascites, by the absence of fluctuation, and by the equable distension of the parietes, which is not altered by position. There can be little doubt that the colon is the most frequent seat of the accumulation in chronic tympanites. When the distension of this bowel is moderate or confined to one part, it is apt to be mistaken for solid tumours. We have observed the abdomen assume a pyriform shape not unlike the protuberance of pregnancy; in such cases the clearness on percussion will be more perceptible in the circumference than in the centre of the abdomen. Distension of the cæcum and ascending colon has often been mistaken for hepatic or other visceral enlargements. Constipation is commonly an attendant of tympanites, but in fever and mucous enteritis it may co-exist with diarrhœa.

The pathology of symptomatic tympanites varies according to the nature of the disease which it accompanies. In some forms of colic, the accumulation of gas takes place together with that of the fæcal matters, and from the same cause, viz. the want of propulsion. In the flatulent and hysterical varieties of colic more gas is formed than in the natural condition. The tympanites of

fever and of peritonitis may be traced to the loss of contractility in the muscular fibres, consequent on inflammation of the mucous or serous coat. The cause of chronic idiopathic tympanites is generally a want of tone in the muscular fibres.

That accumulation of gas, which depends on its inordinate quantity, may be sometimes accounted for by the imperfect digestion of vegetable matter, and its consequent fermentation. The enormous amount of gas evolved by this process is well known; but in other cases, we cannot explain its production in this manner. Thus the suddenness of the affection, its excitement by mental emotion, and its substitution for diarrhœa, show that it must be referred to direct secretion.*

The duration of the chronic disease is indefinite. We have known it last for several years in hysterical women; subject, however, to changes in degree, and sometimes alternating with other manifestations of their Proteiform malady.

Treatment. The tympanites accompanying inflammatory affections scarcely calls for special remedies. In fever, however, it sometimes becomes so prominent a symptom as to need separate attention. If it is not removed by leeching and blistering, we may administer the oil of turpentine in drachm doses, either with castor oil, or in an emulsion with magnesia, mucilage, and aromatic water. The tympanites of flatulent colic must be combated by carminatives, aperients, and stimulating embrocations. The chronic form of the complaint is a great trial of the resources and patience of the practitioner. His chief object must be not only to stimulate the bowel to contractions sufficient for the expulsion of the wind, but also to restore its tone. In pursuance of the first indication we may resort to turpentine, camphor, the fetid gums, carminatives, frequent frictions of the abdomen, and the use of galvanism. For the more permanent effect, aperients combined with tonic medicines are most to be depended upon. Sydenham employed with great success an electuary of iron filings and bitter extracts. We can recommend a combination of sulphate of iron, sulphate of quinine, compound galbanum pill, and powder of capsicum. In an obstinate case we obtained some benefit from strychnia, in the dose of one twelfth gradually increased to one eighth of a grain. Injections of quinine and sulphate of zinc may be employed, when a change of remedies seems desirable. Sometimes we have depended upon the application of cold water in the form of affusion, or of enemata. The support of an elastic belt or of a flannel roller will assist the cure. The artificial removal of the air by means of the tube of a stomach pump passed into the colon has been judiciously practised by Dr. Osborne of Dublin, on the same principle as that of frequently evacuating an atonic urinary bladder by the catheter; for in the latter case, it is well known that the fibres seldom recover their contractility so long as they are subject to distension from a large quantity of fluid.

PERITONITIS.

General observations. — Anatomical characters. — Symptoms. — Diagnosis. — Causes. — Prognosis. — Treatment. — Erythematic Peritonitis. — Puerperal Peritonitis. — Peritonitis from intestinal perforation. — Symptoms and treatment. — Chronic Peritonitis. — Anatomical characters. — Tuberculous complications. — Symptoms. — Latency. — Causes. — Prognosis. — Treatment. — Peritonitis of the Cæcum. — Symptoms. — Termination. — Treatment.

As the peritoneum invests other organs than those which are the particular objects of present consideration, it may seem to be out of our province to treat

* On this subject we beg to refer to the PATHOLOGICAL INTRODUCTION, p. 38.

of inflammation of this membrane generally. It cannot be questioned that disease may affect separately a portion of the peritoneum, which has no other connection with the alimentary canal than that of the continuity of a serous tissue; for example, the convex surface of the liver; but with the exception of this, and perhaps some parts of the coverings of the uterus, its appendages, and the bladder (which are not necessarily though very often accidentally in contact with the intestinal tube), there are no other inflexions of the peritoneum liable to be attacked by inflammation, without extension of the disease to the serous coat of some part of the alimentary tube; a fact easily explained, when we consider that the serous covering of every organ, but those which have been just adverted to, is in contact with some portion of the gastro-enteric surface. The effect of contact in propagating serous inflammation is more obvious than even that of continuity. Hence it is rare to find marks of inflammation on a part of the peritoneum without a corresponding appearance on the opposite surface; and, conversely, we often observe a limitation of the disease to the two surfaces which were in contact when the inflammation began in one of them; as, for instance, between two convolutions of intestine; between these and the omentum; between the uterus and rectum, and still more strikingly, between the upper surface of the liver and the parietal membrane, without extension to the under surface; and again between the ascending colon and the concave surface of the liver, without extension to the convex. At first sight we may consider it difficult to explain this communication of morbid action to an opposite surface, and may even fancy it needful to call in the aid of some such agent as electricity. But there is no necessity for such a notion, if we consider the actual condition of the inflamed membrane, which is hotter than natural, at first dry, and afterwards bedewed with inflammatory serum, or roughened by fibrinous deposit. The application of such a surface to the opposite serous membrane cannot fail to irritate the latter, and to produce a morbid action, which will be of the same kind, because the organisation of the two parts is identical.

Anatomical characters. Redness is far less subject to exception, as a sign of serous than of mucous inflammation, which might have been inferred *à priori* from the difference in the organisation of the tissues, and in the agencies to which they are subjected. There is no danger of confounding the dull cadaveric redness on the outer surface of those folds of intestines, which lie in the most dependent situations, with the vivid inflammatory injection in parts least liable to hypostatic congestion. But if the colour could mislead us, we have the means of correcting our judgment in the absence of inflammatory products. On a mucous surface an additional quantity of the proper secretion, or a serous or fibrinous effusion, may easily escape our notice, but this cannot occur in the shut sac of a serous membrane.

One of the most common appearances on turning aside the parietes, is an adhesion of the great omentum to the inferior folds of intestine, or even to the pelvic organs; the raising of this membrane discovers the convolutions beneath inflated, agglutinated by soft albuminous exudations, and suffused, on their anterior surface, with a bright vermillion tint. On separating the folds we find, according to the period and character of the inflammation, serum clear or milky, sero-purulent fluid, and actual pus, in the inter-spaces. These liquids are found in still greater quantity in the iliac and pelvic fossæ. The collections of pus among the adherent folds appear like small abscesses. The organisation of the false membranes depends partly on the time which has elapsed since the commencement of the inflammation, and partly on the type of the inflammation and the constitution of the individual. In some cases there is very little tendency to organisation, though the inflammation has lasted several days; in others the matter is so plastic, that bloodvessels have been detected in it after a few hours. The colour of the fibrinous deposit is sometimes a yellowish green; more commonly a dull white.

Peritonitis may be universal or partial. The inflammation is oftener li-

mited in situations where there is but little motion between the opposite surfaces, and consequently little change of contact, and *vice versâ*. Hence it is more diffused over the small intestine, but circumscribed in the neighbourhood of the cæcum, the liver, the spleen, and the uterus.

Gangrene and ulceration from acute peritonitis are very rare.

Symptoms. An attack of this disease is sometimes preceded by chilliness, rigors, and a feeling of indisposition, but frequently it comes on abruptly, with acute pain in some part of the abdomen, generally in the hypogastric or one of the iliac regions. The pain is aggravated by any movement of the body, which puts the abdominal muscles into play, particularly by coughing, sneezing, sighing, evacuation of the bladder, &c. Pressure is extremely distressing, and even the bed-clothes may be felt an incumbrance. The patient lies supine, and often with his knees drawn up, probably from an instinctive desire to relax the abdominal muscles, and to avoid the contact of the bed covering; but not unfrequently the great degree of weakness well accounts for this position. The belly is hot, tense, and for the most part, as the disease advances, tympanitic. The bowels, if not constipated at first, become so in the progress of the disease; and nausea and vomiting are frequent from the very commencement.

The skin is generally dry and hot, and the pulse rapid, small, and hard. The tongue has a white fur, the lips are dry, the cheeks pale and collapsed, and the eyes sunk, while the countenance indicates great physical distress and depression. To a practised eye the disease is distinguishable by the countenance only, even when the other characteristics are wanting.

Such is the ordinary display of symptoms in well-marked cases of peritonitis; but the disease is very apt to steal on insidiously, rather by the absence of the usual phenomena, than by the assumption of characters significant of other maladies. We must allude to one or two variations of the symptoms.

The bowels may continue to act without impediment during the whole course of the disease: when this is the case, it must be inferred that irritation has not extended as usual to the muscular coat, sufficiently to produce either spasmodic or paralytic obstruction. (See Colic.) Vomiting under similar circumstances may not occur. The pulse, instead of rising to 120° or 130°, may keep as low as 80° or 90°, or even at its natural rate; and the temperature of the skin may be scarcely at all elevated. After the consideration of these and other anomalies, Dr. Abercrombie is of opinion that our chief reliance for the diagnosis must be placed on the tenderness of the abdomen. This symptom, however, appears to us to be rather calculated to awaken suspicion of peritonitis in the absence of other signs, than sufficient for distinguishing it from other diseases; since tenderness may exist in many cases where the peritoneum is not at all involved.

The effusion of coagulable lymph may be sometimes detected by an impression conveyed to the ear, and to the hand. Dr. Beatty of Dublin was the first who described the sign alluded to. (*Dub. Journ.*, vol. vi.) In a case of peritonitis supervening on ovarian dropsy, "a remarkable sensation was communicated to the hand, when applied over the umbilicus and its neighbourhood. The sensation was, that of a grating or rubbing together of two uneven and rather dry surfaces, and was rendered most evident by ordering the patient to take a full inspiration, thereby causing the abdominal parietes to move more freely over the surface of the tumour. By the application of the stethoscope a loud and distinct *frottement* was audible, extending over a space of about five inches in diameter, with the umbilicus for a centre." Dr. Bright subsequently published some similar observations in the *Med. Chir. Trans.*, vol. xix. He describes the feeling given to the hand as "varying between the crepitation produced by emphysema, and the sensation derived from bending new leather." Afterwards Dr. Corrigan investigated this subject (*Dub. Journ.*, vol. ix.), and adduced reasons for concluding that it is necessary to the production of the sign, that the effused lymph should be in an unorganised condition. Dr.

Beatty was of opinion that the sign is observable only in cases "where one at least of the opposed surfaces is adherent to a solid resisting body. Although it does not appear that this condition is indispensable, the general correctness of Dr. Beatty's views is proved by the fact, that out of twelve cases collected into a tabular form by Dr. Stokes (*Dis. of the Chest*, p. 478.), nine presented an organic tumour.

Diagnosis. 1. From *Enteritis.* We have confined this term to inflammation of the mucous coat of the intestines, which may generally be distinguished from that of the peritoneum by the tendency to diarrhœa, the slighter degree of pain and tenderness, the softer pulse, the absence of vomiting, and the redness at the tip and margin of the tongue. 2. From *Ileus.* In many cases of this affection, especially of that form accompanied by inflammation of the muscular coat, the enteritis of some authors, the diagnosis from peritonitis is impossible at a certain stage. The pain, tenderness, vomiting, constipation, distension, and fever are the same in both diseases, when fully formed; but the mode of accession and the order of the symptoms are different. In Ileus the inflammatory symptoms are secondary to the obstruction, while in peritonitis they begin the attack, and take the lead throughout. 3. From *Hysteria.* This is by far the most important department of the diagnosis, in a practical point of view, because the treatment of the two affections is widely different. The hysterical imitation of peritonitis may often be detected by the superficial tenderness, which, although greatly excited by slight pressure, and even to a more intense degree than in peritonitis, is sometimes alleviated by deeper pressure. Often a similar tenderness may be discovered on the chest and limbs, though not complained of by the patient. Pressure upon the lumbar vertebræ also elicits pain in many cases of this description; but we cannot agree with Dr. Griffin in assigning as much importance as he appears to have done to this sign, as distinctive of neuralgic affections of the abdomen generally from peritonitis, though it is certainly a useful help when taken in connection with other signs. We have known it present in cases of acute inflammation of the mucous follicles. In many instances we must depend principally upon the history of the case, the expression of the countenance, the mental phenomena, the connection with menstrual irregularities, the fugitive character of the symptoms, and the thousand anomalies appertaining to hysterical cases.

Causes. An attack of peritonitis may be brought on by exposure to cold, more especially when the skin has been previously relaxed by a warm atmosphere, or by fatigue. The disease is also known in connection with such causes as mechanical injury of the abdomen, the state of the uterine system left by parturition, and the introduction of foreign matters into the serous cavity, as by perforation of the alimentary tube, bursting of hepatic abscess, rupture or ulceration of the biliary ducts, &c. It has likewise been produced from metastasis of rheumatism. (Andral, *Clin. Méd.*, t. iv. p. 535.)

Prognosis. If the case is seen early enough for the application of remedies to the first stage, we may entertain fair hopes of recovery; but if the disease has been allowed to run on unchecked, if the abdomen has become tympanitic, if the vomiting and constipation are established, if the pulse is frequent and thready, and the strength prostrate, and especially if there is hiccough with cold perspiration, the danger is extreme.

It must not be hastily inferred from the mere returning action of the bowels that the malady is resolved; for we have known a state of general collapse ensue, in which the rectum and sphincter ani become relaxed and permit the escape of the fluid contents of the bowels, with any thing but an amendment in the condition of the patient. This is a great disappointment to the friends of the sufferer, who fancy that the malady must cease with the obstruction. A due attention to the accompanying symptoms will save the practitioner from the prognostic error alluded to. The duration in fatal cases is various. It may run its course in less than thirty-six hours; while in other cases the ter-

mination has been protracted to a fortnight or three weeks; but these are extreme periods, the average duration being from six to eight days.

Treatment. From the moment that peritonitis is recognised, there is but one plain straightforward course to pursue, viz. to overcome the inflammation. For this purpose our great dependence must be placed on general bloodletting. Dr. Abercrombie has some admirable observations on the employment of this measure which we cannot forbear quoting: —

" In all cases of active inflammation, bloodletting can be of comparatively little avail, unless it be used at an early period, and pushed to such an extent as to make a decided impression upon the system, as indicated by weakness of the pulse, paleness, and some degree of faintness: and a practice to which I am very partial in all urgent inflammatory cases, is to follow up this first full bleeding by small bleedings, at short intervals, when the effect of the first begins to subside. In this manner we prolong, as it were, the impression which is made by the first bleeding, and a twofold advantage arises from the practice, namely, that the disease is checked at an early period, and that the quantity of blood lost is in the end much smaller than probably would be required under other circumstances. If we allow the patient to lie after the first bleeding ten or twelve hours, or even a shorter period, the effect of it is entirely lost; and a repetition of it to the extent of twenty ounces may be required for producing that effect upon the disease, which, by the former method, might be produced by five; and besides, the disease has in the interval been gaining ground, its duration is protracted, and the result consequently rendered more uncertain. The inflammation of a vital organ should not be lost sight of above an hour or two at a time, until the force of it be decidedly broken, and unless this take place within twenty-four hours, the termination must be considered as doubtful." (*Op. cit.*, p. 173.)

Leeches should be applied to the most tender part of the abdomen, immediately after the first bleeding, and repeated frequently according to the obstinacy of the inflammation and the strength of the patient. Blisters should never be employed in the early period of the disease; they prevent our ascertaining the state of the parts by pressure, and are by no means desirable remedies until blood has been freely abstracted both locally and generally. In the advanced stage, when the abdomen has become tumid, and tympanitic with obtunded sensibility, when in fact there is reason to believe that lymph and serum have been freely secreted, a very large blister may effect a salutary revulsion. The best external applications when the inflammation is active are warm poultices made of bran, but we must take care that they are not ponderous. In some cases hot turpentine fomentations have a good effect; while in others cold evaporating lotions have seemed preferable. The evaporation may be accelerated by blowing the surface with a common bellows. We have placed a patient in a warm bath, sufficiently long and shallow for him to lie extended, and for the tumid abdomen to rise above the level, so that we could pour a jet of cold water upon the latter. The relief to the feelings has been most striking even when the disease was too far advanced for a cure.

Many practitioners are in the habit of administering strong purgatives in this disease. If such medicines are given, as we fear they too often are, for the purpose of removing the constipation, we think the practice, to say the least of it, very unphilosophical. The obstruction is but the effect not the cause of the inflammation, and will be removed with the latter. It is not wonderful that the patient and his friends should be importunate for medicines which they imagine would get rid of what they suppose to be the predominant mischief; but the practitioner ought never to give way to this prejudice, but, on the contrary, to explain to them that the great object is to subdue the inflammation, and that the bowels will afterwards take care of themselves. This treatment, however, is not superfluous merely; it may be positively injurious, since by increasing the peristaltic action we put in motion the inflamed part, which on the contrary ought to have as much repose

as possible. There is moreover the danger of tearing asunder recent adhesions, and thus producing additional irritation. We are of opinion, that there is only one principle upon which these medicines might be useful, viz. that of producing a strong revulsion to the mucous membrane. Could we be sure that the inflammation was in its first stage, such a plan of treatment might be adopted with comparative safety; and in cases which forbid the abstraction of blood, we might be tempted to use it, taking care to select those articles which have most of the hydragogue property.

Although we have thought it right to condemn the use of powerful cathartics, we see no objection to such mild laxatives as may keep up the usual secretions of the mucous membrane; for example, small doses of rhubarb, with hyoscyamus, or aloes and hyoscyamus; or perhaps still better, the tartrate of potash and soda, given at intervals in an effervescing form.

From the time the case first comes under treatment, mercury should be exhibited in such quantities as will bring the system under the full influence of this agent, should it become necessary to do so. We have often found reason to regret that the decisive administration of this remedy had been deferred until the treatment of bloodletting and other means had proved unsuccessful, and that in this way much valuable time had been lost; whereas if the mercury had been given at regular intervals from the commencement, a comparatively slight increase of the doses, or their more frequent repetition, would have effected our purpose; and on the other hand, if the disease had yielded to other means, we might have discontinued the use of it before the specific effects were developed. Experience has therefore long taught us to begin at once the employment of mercury in every case of acute inflammation, which may in its course require the operation of this remedy, and not to wait till the necessity for it becomes manifest. Acting on this principle, we may in the treatment of peritonitis prescribe calomel in doses of three grains every four hours, with half a grain or more of opium, which will prevent irritation, and at the same time mitigate the pain. If the necessity for the medicine becomes more striking, we can administer the calomel and opium at shorter intervals, or even in very urgent cases at the same time introduce mercury by inunction. When the gums become sore, we may entertain a favourable opinion of the issue of the case.

The vomiting in this disease is often an embarrassing circumstance; but it may be sometimes overcome by hydrocyanic acid or by creasote, and sinapisms or hot laudanum fomentations applied to the epigastrium. It is a great object to quell this symptom, not only because of the distress and the augmentation of pain which it occasions, but also because it interferes with the regular use of remedies.

In the advanced stage of the disease, when all hope of succeeding by antiphlogistic measures is given up, we must endeavour to give nature a chance of spontaneous cure, by supporting the strength. For this purpose wine may be taken freely, and quinine dissolved in beef tea may be injected into the colon.

It is generally a most unfavourable sign, when, notwithstanding the cessation of pain and tenderness, the bowels refuse to act, and the abdomen continues distended. Sometimes however these latter symptoms depend simply on the loss of muscular tone, caused by the inflammation, though the latter has subsided. When this is the case, the state of the pulse and the temperature of the body may give a more encouraging view; mild laxatives and assafœtida injections are useful under such circumstances. The pulse, as Dr. Gooch observes, is often the last thing to mend, continuing frequent long after the pain has ceased, and the bowels have resumed their function. For this symptom, which in many cases may be attributed to the irritability induced by the loss of blood, digitalis is the best remedy.

Erythematic or *non-plastic Peritonitis.*

The peritoneum is liable to a form of inflammation which is accompanied by fever of an adynamic character, and which terminates rapidly in the secretion of serous fluid, generally white and milky, sometimes bloody, with scarcely any intermixture of coagulable lymph. When the latter substance is found, it is in flakes, scarcely or not at all adhering to the membrane. We have observed this form of peritonitis in puerperal women, and Dr. Abercrombie relates some interesting cases in which it attacked persons suffering from epidemic erysipelas.

The progress of this disease is rapid, and the termination generally fatal. The local symptoms are not so acute as in the common peritonitis, the abdomen being less painful and tender, and the bowels often freely open, but the powers of the system are very soon depressed, and the pulse from the beginning is frequent and feeble.

It is most probable that peritonitis of this nature is secondary to a febrile affection of the whole system (perhaps a disorder of the blood), which may result from a peculiar condition of the atmosphere, or from the previous habits of the individual, or from that state of the system which ensues upon parturition. If the fever were only secondary to the inflammation it would be impossible to account for the rapid termination of the disease, seeing that the local disorganisation is much less severe than in the usual form of peritonitis, and for the comparative uselessness of antiphlogistic remedies.

Scarcely any thing satisfactory can be said of the treatment; local depletion affords some relief, without making any impression on the general condition, for doing which indeed there is little time, whatever be the means adopted. The rapid introduction of mercury into the system, and maintaining the strength by wine and bark, appear to us to hold out the best prospect of success. After a single application of leeches the abdomen should be covered by a large blister.

Puerperal Peritonitis.

Women are liable to inflammation of the peritoneum when recovering from child-bearing. The usual time for its accession is about the third day, but it may occur much later. In many cases, especially when the disease is sporadic, it does not differ in its nature and characters from common acute peritonitis, excepting as to the symptoms depending on the peculiar circumstances of the patient; such as the suppression of the lochia, and of the milk, and the almost universal commencement of the pain and tenderness in the uterine region. This form of the malady may require the same activity of treatment as when it occurs in other subjects.

Puerperal females are also subject, as we have already stated, to the erythematic form of peritonitis.

Both these forms may occur epidemically, but especially the latter. The former must be viewed in connection with the fever which accompanies it, if we wish to adopt an appropriate treatment. In sporadic cases the fever is generally active and inflammatory; but in the epidemic variety it assumes more or less of the typhoid type, and therefore the treatment must have reference to this. In some cases the peritonitis must be viewed merely as a complication of puerperal fever, holding the same relation to it as pneumonia, bronchitis, and enteritis to continued fever. But in other cases the inflammation may be primary, depending on the state of the uterus after delivery, such as uterine phlebitis, or inflammatory softening of the substance of the womb; and yet we may find the fever of a decidedly typhoid character, just as we may have a typhoid pleuritis or pneumonia. In both cases there pre-exists a certain state of the constitution, induced by the habits of the individual, or by an atmospheric miasma, which causes the fever to assume a typhoid form. (For an account of the peculiar characters and treatment of puerperal peritonitis, see PUERPERAL FEVERS.)

Peritonitis from intestinal Perforation.

We think it better to offer in this place a few separate remarks to this subject, not only because the accession of the phenomena is peculiar, but also because a particular kind of treatment is requisite.

Perforation of the alimentary canal is commonly the result of ulceration, which may gradually erode all the coats, proceeding from the mucous to the serous; or when it has arrived at the latter, the solution of continuity may be finally caused by mechanical rupture. This rupture may be determined by the internal pressure of flatus, or of a large quantity of alimentary or fæcal matter; or by the sudden external pressure of the abdominal muscles in straining at stool, coughing, sneezing, &c. For the latter effect it is necessary that the tube should contain at the time a certain quantity of air, the compression of which by the abdominal muscles causes the accident in question. There is another mode in which this lesion may occur. The serous membrane at the base of the ulcer may be adherent to an adjoining fold of intestine, and during increased peristaltic contraction such force may be exerted upon the false membrane, as to tear away the thin partition between the ulcerated intestine and the peritoneal sac.

The ulcerations most frequently productive of this accident, are those which destroy the follicles in typhoid fever and in phthisis. Ulcers of the stomach and the duodenum also give rise to it; but they are more frequently guarded by adhesions to the adjoining viscera. (See Ulceration of the Stomach.) The opening is sometimes very minute.

The *symptoms* of intestinal perforation are very characteristic. Excruciating abdominal pain comes on suddenly, and generally in the ileo-cæcal region, accompanied with considerable tenderness on pressure, and painful micturition; this is soon followed by great frequency and feebleness of the pulse, collapse of the features, and other indications of sinking. The abrupt supervention of such symptoms in a case of ileo-colitis, typhoid fever, or phthisis, can scarcely fail to conduct the mind to the true pathology of the case. It is to be regretted that we are not also led to the means of cure. Peritonitis thus induced is nearly always fatal, partly because the exciting cause is not to be removed, and partly because the patient's condition, resulting from previous disease, is little fitted for struggling with so severe a lesion. The cure however must be attempted, and we have the encouragement of knowing that it has been occasionally though very rarely successful. Dr. Stokes records one case in which life was saved, and another in which the treatment adopted was manifestly useful. The plan adopted was one that had been previously employed with success by Dr. Graves, in peritonitis occurring after ascites, and after the discharge of an hepatic abscess. It consisted in simply administering large doses of opium and supporting the strength.

Bleeding cannot be practised on account of the depression of the vital powers, and for mercury there is no time; besides that, as Dr. Stokes remarks, it might do harm by increasing the peristaltic action. The object in using the opium is to keep the bowels in complete repose, in order that the organisation of coagulable lymph may go on undisturbed, and also to prevent any more of the contents of the canal from escaping. We subjoin the account of the successful case related by Dr. Stokes:—"In the next case the disease was of three days' standing, and it supervened suddenly from a hypercatharsis produced by an over dose of Glauber's salts. The patient was apparently in the last stage when the opium treatment was commenced. He was ordered a grain of opium every hour. Next day the symptoms were decidedly improved, and though he had taken twenty-four grains, he had not experienced the slightest coma, headach, or delirium. The same plan of treatment was persevered in, the daily doses of opium being gradually diminished until the tenth day, when the convalescence being established the remedy was omitted. During this time diarrhœa set in

for three or four days severely: this was treated by the application of a few leeches to the anus, and the use of anodyne enemata. The patient took in all 150 grains of opium, exclusive of that in the injections, without experiencing any of the usual effects of this remedy in large doses." (*Cyc. Pract. Med.*, art. PERITONITIS.)*

Chronic Peritonitis.

Acute inflammation of the peritoneum may pass gradually into the chronic form, or the inflammation may be chronic from the commencement.

Anatomical characters. The omentum, the parietal peritoneum, the intestinal folds, and the surfaces of all the abdominal viscera, are not unfrequently found agglutinated to each other, so as to form one mass of disease. Oftener, however, the formation of liquid as well as solid deposits causes a separation of some of the surfaces into sacs of various dimensions. The liquids are serum of a sanious character, sero-purulent fluid, and true pus. Pus is sometimes collected to the amount of several pounds. The solid matter may be coagulable lymph, only in various degrees of organisation, but far more frequently it is largely mixed with tuberculous secretion, which is either in the form of miliary semi-transparent tubercles, or of opaque yellow nodules, flakes, and masses. Tubercles may be found on the attached as well as the free surface, embedded in the cellular membrane.

The thickening of the peritoneum, whether from fibrine or tuberculous matter, or more frequently the mixture of these substances, varies from two or three lines to three quarters of an inch. Sometimes the hardness of these formations equals that of cartilage. The surface of the parietal membrane is not unfrequently rough, or presents an areolar appearance, owing partly to the motion of the opposite surfaces while the deposit was going on, and partly perhaps to the simultaneous formation of non-organisable matter, which afterwards separating from the lymph leaves little cavities behind it. The latter explanation is applied by Dr. Hodgkin to the worm-eaten appearance met with on the surface of the liver and the spleen.

M. Louis is of opinion that chronic peritonitis, which has been such from its commencement, is always complicated with tubercles. Dr. Hodgkin observes on this point, "My own inspections would lead me also to the conclusion, that chronic peritonitis is very frequently conjoined with tubercles: yet this concurrence has not been so uniformly supported by cases observed in this country, as it has been by Louis's cases. That form of peritonitis which is accompanied by copious effusion, and which might easily be regarded as ascites, occurs without any appearance of tubercles. The same may be said of other cases in which the concrete product of inflammation had been more considerable." (*Lect. on Morb. Anat. of Serous and Mucous Membranes*, vol. i. p. 149.)

We have in our own experience known some exceptions to this law, though it must be stated that in these cases the peritoneal inflammation was secondary to disease in some of the viscera, such as the liver and the ovaries, and we are inclined to the belief that chronic inflammation, not consequent upon an acute attack, or upon mechanical injury, or upon disease of any other abdominal organ, is confined to scrofulous subjects, and is in fact tubercular.

The colour of the deposits in chronic peritonitis is often dark brown or blackish, owing to the stagnation or effusion of blood, and the chemical action of gaseous acids which have penetrated the intestinal coats, or of decomposed pus. The grey granulations are often surrounded by blackish circles, caused by stagnant blood, which have been mistaken for punctiform melanosis.

The mesenteric glands in this disease are often enormously hypertrophied, and stuffed with tuberculous matter, constituting a form of Tabes Mesenterica.

* An ample collection of facts, illustrative of peritonitis by perforation, will be found in the *Rech. Anat. Path.*, by M. Louis, in the article by Dr. Stokes above quoted, and in a memoir by M. Cazenave, in *Gaz. Méd. de Paris* for December 30. 1837, and January 6. 1838, entitled "Memoire sur les Perforations intestinales qui surviennent pendant le cours des fièvres typhoïdes."

Ulceration may affect communications between the intestinal canal and circumscribed sacs in the peritoneum, or the convolutions may be so matted together that the latter result cannot occur, in which case several similar openings by ulceration may perforate the adherent folds, so as to make false passages or short cuts across the convoluted intestine, while the natural winding passage becomes obliterated by the pressure of deposit from without, and the want of distension from within.

The profession is greatly indebted to Dr. Baron for having been the first to give an accurate account of tuberculous disease of the peritoneum.*

Symptoms. The accession and progress of this disease are extremely insidious. In many cases there is but very little pain, in others none at all. In some instances, attacks of pain of a griping character come on for a day or two, and then subside, and do not return for weeks or months. A very common symptom is what Dr. Baron describes as a "broiling heat," in the region of the stomach. We met with a case not long since in which this feeling continued up to the time of decease. The bowels are generally irregular; sometimes constipated, but far more frequently relaxed; the motions being of a light yellow or stone colour, and of spongy consistence, with a good deal of fetor. The patient often complains of nausea, and the tongue has a bright red colour, and is glazed or chapped, or it is of a duller hue, but turgid and uneven on its surface. These states of the tongue, taken in connection with the nausea and the diarrhœa, often give the impression of disease in the mucous rather than in the serous coat.

When vomiting occurs, the matter is generally of a leek green appearance, consisting of bile, which has acquired this colour from the action of the acids in the stomach. The urine is scanty, and deposits a reddish sediment. The skin is very prone to perspiration, especially at night, and is often muddy and otherwise unhealthy in appearance.

Emaciation is one of the most constant and marked symptoms. The extremities are cold, pinched, and bluish; the eyes are sunken, and surrounded by a dark halo; and there is a faded look of the whole form and countenance. The pulse, in every case of tuberculous peritonitis that we have met with, has been more or less frequent and feeble. But in the chronic peritonitis, left by acute disease, we have known it very little above the average rate.

An examination of the abdomen must be made, and, if conducted with care, it will nearly always enable the practitioner to recognise the disease, if he connects the local signs with the general condition of the patient. There is generally more protuberance than natural; and if there is fluid secretion, we find fluctuation and dulness on percussion; more commonly there is a feeling given to the hand, removed alike from the elastic resistance of fluid or gaseous accumulation, and from the suppleness of the healthy abdomen; a feeling which has been well represented by the term *doughy.* In kneading the abdomen, we seem to move the parietes and viscera together *en masse.* The tenderness is variable, seldom very acute, and in many instances absolutely wanting. In doubtful cases we have been enabled to form an opinion with greater certainty by exploring the chest, and discovering tuberculous disease of the lungs. Frequently we may detect inequalities of the abdomen, caused by masses of tubercular accretion, which, however, must not be confounded with scybala or enlargements of the colon. In many instances we have detected them after fluid effusions had been absorbed; and we have at present under our eye, a young lady in whom a large accretion still exists, left by the ascites of chronic peritonitis, though she has completely regained her health, being subject only to attacks of constipation, apparently caused by the pressure of this formation.

Tuberculous peritonitis is sometimes completely *latent* till a short time before death, which takes place suddenly and unexpectedly. In many cases of this sort the individual has been observed to fall off in general health and

* See an Inquiry into the Nature of Tuberculated Accretions of Sorous Membranes, &c. by John Baron, M.D. &c. 1819.

strength, and to be somewhat emaciated, but still not in such a degree or in so palpable a form as to awaken alarm or to cause application for professional assistance. Perhaps there have been slight attacks of pain and alvine relaxation, which have passed for common bowel complaints. But suddenly the patient is seized with greater pain than usual, and rapid sinking of the vital powers, and dies within thirty hours. On examination of the body it is found that besides numerous deposits of lymph and tuberculous matter, a circumscribed collection of pus had burst its sac, diffused itself over the whole cavity, and thus caused the fatal termination of the case.

Causes. It has been already admitted that acute peritonitis may terminate in the present form. The tuberculous variety originating primarily in the strumous cachexia may be developed by any of the common causes of disease, both internal and external. A neglected state of the bowels and of the skin, and an attack of fever, may be numbered among the former; and colds, fatigue, and imprudences in diet, among the latter. The most frequent subjects are females between the ages of fourteen and twenty-one.

The *Prognosis* can be scarcely favourable, unless the habit of the patient is healthy, and the disease can be viewed as the remains of an acute attack. Cases, however, even of the tuberculous form sometimes improve beyond our hopes. We have already alluded to one of this description, which was the more unfavourable, because the father of the patient had died not long before of phthisis; and Dr. Abercrombie remarks, "I have seen cases terminate favourably in families which had formerly suffered from this affection; and their symptoms corresponded with those which had been observed in the earlier stages of the cases which had been fatal." (*Op. cit.*, p. 191.)

We have been disappointed to find, that after the abdominal disease had appeared to abate, the pleura became similarly affected; and in one case, after this secondary disorder had likewise given way, the patient sank under tubercular meningitis.

Treatment. It rarely happens that general bleeding can be thought of; even topical bleeding by leeches is often as much as the patient's strength can bear. This may be succeeded by or may alternate with blisters. When the disease is in an indolent state, and especially when it is conjoined with liquid effusion, friction with liniments, or unguents containing iodide, of potassium, may be used, and we have often been surprised at the rapidity with which ascites of this description disappears under such treatment. It may also be adopted with the view of discussing by absorption the more solid deposits. Iodine may also be exhibited internally, but with caution, and only in combination either with potassium or with iron. Opiates will be required for the relief of pain and diarrhœa. The vegetable alteratives are sometimes useful; such are sarsaparilla and taraxacum. They may be succeeded by or conjoined with light bitters, viz. Dec. Lichen., Inf. Cascar., and Inf. Cinch., to which Tr. Myrrhæ may be added. The diet should be nutritious and compendious.

Peritonitis of the Cæcum.

This form of peritonitis is nearly always connected with disease of the other coats of the cæcum, or of the appendix vermiformis; and its limitation may be attributed to the fixed position of the bowel.

When the inflammation has extended from the muscular and mucous coats, the cause of the disease is an accumulation of fæcal or indigestible matters; such as crude fruits, cherry stones, kernels of nuts, &c. The *symptoms* begin with dull pain and feeling of distension in the right iliac fossa, becoming acute after a few hours, constipation, and nausea. A tumour may be detected in the above situation, which is often acutely tender; and if the patient allows us to handle it, we perceive a dulness on percussion, and a non-elastic boggy sensation. When the inflammation begins in the appendix, which is generally owing to the impaction of some hard substance (such as a kernel, a piece of

hard excrement, a biliary concretion, a nail, a tooth, &c.), though an external contusion might also give rise to the disease, the symptoms are from the beginning more acute, and the signs of cæcal accumulation less obvious. This form of the disease is also more fatal, from the impossibility of extricating the irritating substance.

The disease, if not speedily relieved, leads to the formation of abscesses, either in the anterior or posterior parietes; most frequently in the lumbar region, partly because it is the most depending in the recumbent posture, and partly because the cæcum not being covered in that situation by peritoneum, the inflammation extends more readily to the cellular tissue between the gut and the muscles. The abscess may open itself outwardly, or burst into the peritoneum. From the situation of the appendix, Dr. Burne infers that its perforation is more likely to be followed by serious results than that of the cæcum itself. (*Med. Chir. Trans.*, vol. xx.)

This disease is sometimes chronic, and causes gradual disorganisation and ulceration of the coats of the cæcum.

The treatment consists in depletion, not however to the extent pursued in idiopathic peritonitis, but chiefly by leeches applied from day to day, fomentations, poultices, and laxatives combined with opiates. When the integuments are œdematous, or when from the emphysematous feel there is reason to apprehend gangrene, no time should be lost in making an artificial opening.

ENTERALGIA.

The intestines are subject to a painful affection, which can be referred only to neuralgia. It is observed in neurotic subjects of all kinds, but especially in persons affected with dyspepsia, hypochondriasis, hysteria, gout, and suppressed or difficult menstruation. Sometimes it is complicated with irregularities of action in the bowels, and disorder of the secretions, the altered qualities of which produce more irritation than in persons who have not the same predisposition as the subjects of this complaint. Frequently it exists alone, and can be traced to some mental disturbance, or to changes in the atmosphere. The pain is sometimes relieved by pressure, at other times aggravated. When the latter is the case, it may be confounded with rheumatic or gouty pains in the abdominal muscles and aponeurosis.

Enteralgia is in female subjects very often associated with spinal irritation.

This affection is distinguished from inflammatory diseases in the abdomen, by the absence of the characteristics of these, and still more decidedly by the precursory and concurrent phenomena. We have already touched upon this subject in our remarks on the diagnosis of peritonitis.

The *treatment* of enteralgia may be commenced by insuring the removal of any cause of irritation within the canal, by a mild laxative, such as castor oil, with a few drops of laudanum; after which we may employ sedatives with greater freedom. Camphor, henbane, and compound galbanum pill, may be administered when there are reasons for withholding opium and morphia. Anodyne fomentations, and poultices, sedative enemata, and the warm baths, are valuable auxiliaries. If there is spinal tenderness, a few leeches or a blister, or rubefacient embrocations, applied over the lumbar vertebræ, will often do more good than anodynes on the abdominal surface. It is almost needless to add, that the treatment will be very incomplete, if we confine our efforts to the relief of the pain, instead of endeavouring to correct the morbid susceptibility of the nervous system, and to remove the accompanying disorder in other organs. (See the treatment of Gastralgia.)

DISEASES OF THE MESENTERIC GLANDS.

Simple acute inflammation. — Tuberculous degeneration.— Calcareous deposition.— Osseous transformation.— Induration. —Causes.— Complications.— Symptoms. — Diagnosis. — Treatment.

1. *Simple acute inflammation* of the mesenteric glands seems to have been noticed by pathologists principally as taking place in the progress of certain forms of fever. Baglivi appears to have had some knowledge of the liability of these glands to be affected in fever, and to have paid particular attention to this complication of disease as occurring in Rome; but it was in the account given by MM. Petit and Serres of a fever which prevailed at the Hôtel Dieu of Paris in 1811—1813, that the actual state of the mesenteric glands, when they become diseased in the progress of fever, was first very distinctly pointed out. These authors showed that the state of the glands of the mesentery, in those dying of this epidemic, most usually corresponded to that of the mucous membrane of the intestinal canal; that is to say, according as this membrane was less or more ulcerated, the mesenteric glands were less or more advanced in inflammatory degeneration. Hence the name of entero-mesenteritis, which they conferred upon this form of fever. In the writings of the more recent French pathologists, as Cruveilhier, Chomel, and Louis, the frequent coexistence in fever, of disease on the inner surface of the intestinal canal, originating as it is now supposed in the glandular follicles there situated, with disease in the mesenteric glands, seems to be very fully established.

2. The most important structural alteration to which the mesenteric glands are subject, is unquestionably that which has usually been called their *scrofulous*, or, in the language of modern pathology, their *tubercular degeneration.* As being supposed frequently to occur independently of any other form of morbid affection, and to give rise to a peculiar and recognisable train of symptoms, tubercular degeneration of the mesenteric glands has been regarded as constituting a particular or special disease, to which many nosologists have applied the name of *Tabes Mesenterica.* It is to be regretted that classical nosology does not possess some shorter term, such as the French name of *Carreau,* for designating this disease.*

The alterations found in the mesenteric glands of persons dying of tabes mesenterica present very great diversities, according to the period at which death has occurred. In a patient dying before the tuberculous affection has made much progress, and consequently before the glands have become entirely converted into tubercles, these organs may be found either inflamed, or not presenting any trace of inflammation. In their inflamed state the texture of the glands is red, swelled, more or less gorged with blood, and more resistant under the scalpel than in their sound state. "At the earliest period at which we have an opportunity of examining the diseased glands," says Dr. Abercrombie, "they present, when cut into, a pale flesh colour, and a soft fleshy texture, and we sometimes find them of very considerable size, though merely presenting this texture." The tuberculous matter is developed in the substance of the inflamed mesenteric glands, under the form of small round or irregular grains; in some rare cases it is deposited under the form of small patches, or irregular plates or stripes, which insensibly merge in the texture of the glands, and are closely adherent to it. When, again, the tuberculous glands are not in a state of inflammation, they are neither red, nor swelled nor indurated, sometimes even they are paler than in their healthy state. The tubercular matter is, in such cases, in the form of grains, or of small round or irregular

* The best monograph on this disease which has yet been published is, in our estimation, that by M. Guersent, in the *Dictionnaire de Médicine*, art. CARREAU, from which we shall freely borrow in the following notices, in the persuasion that we shall thereby render a service to English medical literature.

masses, and adheres less closely to the glandular texture than when inflammation has existed. It seems to be merely interposed between the gland and the peritoneal coat. The shape of the glands is variously altered, according to the part in which the tuberculous deposition has taken place; and their proper texture, from the compression to which it is subjected, is gradually reduced to a very small volume. When the affection has existed for a great length of time, and is very far advanced, the glands are often completely destroyed, or transformed into masses of isolated or agglomerated tubercles of different sizes, from that of a pea to that of an egg: there can then no longer be recognised any trace of the glandular texture.

Mesenteric tubercles pass through all the states of degeneration to which that species of morbid texture is liable in other situations. As the disease advances, according to Dr. Abercrombie, the glands seem to become firmer, and to lose the flesh colour, assuming first a kind of semi-transparency, and afterwards a firm opaque white structure, resembling the white tubercle of the lungs. In a mass of considerable size we often observe these various structures in alternate layers, but in the advanced stages the opaque white tubercular matter is the most abundant, and this appears to become afterwards gradually softened, degenerating into a soft cheesy matter or ill-conditioned suppuration. It is rare however, as Guersent remarks, to find very fluid pus in mesenteric tubercles, either because, after pus is formed, it is in part reabsorbed, or because patients frequently sink before the tubercular affection arrives at the stage of suppuration.

3. There is sometimes found in mesenteric tubercles a dry and loamy or *calcareous matter*, analogous to that which is more frequently met with in the bronchial glands when in a state of tubercular degeneration.

4. The mesenteric glands not unfrequently assume the *osseous transformation*, a considerable number of them being sometimes found converted into bone: this has often been seen in cases of mesenteric tabes. In general the glands so affected prove, on examination, to be formed of an osseous shell, containing a substance that bears a resemblance to loam or plaster.

5. M. Guersent mentions another species of degeneration sometimes observed in the mesenteric glands, that of *induration*, which, though it has often been confounded with scirrhus, is in reality very distinct from it. The glands, when thus degenerated, are much larger than in health, their texture is of a pale grey, almost entirely colourless, dense, smooth, and resisting under the scalpel, but it is neither so dense nor so shining and transparent as scirrhus. This species of induration is analogous, according to M. Guersent, to that which is observed in entero-mesenteritis, and appears to be the result of an inflammatory degeneration of the glands; for the same appearance is met with in the glands of the neck, of the bronchia, and of other parts of the body.

Causes. Tabes mesenterica is not, as has been often imagined, a disease peculiar to infancy. Tubercles are found in the mesenteric glands at all ages, in fœtuses from six to seven months, in children dying at birth or soon after it, in infants, in adults, and in persons of fifty or sixty years and upwards. The disease is, in truth, more common between the first dentition and the age of twelve or fifteen years, merely because tubercular affections in general are more common at that period of life. But M. Guersent is convinced that, even in children, mesenteric tabes is not so common a disease as some writers affirm. Bayle states, that out of 100 dead bodies there are scarcely found four which exhibit mesenteric tubercles. He speaks, indeed, of persons of all ages. But at the Hôpital des Enfans Malades of Paris, where the patients admitted are never below twelve months nor above sixteen years of age, the proportion of cases in which mesenteric tubercles are found, amounts, according to Guersent's calculation, to from seven to eight per cent., at least in girls, who appear to him to be generally more subject to pulmonary and mesenteric tubercular affection than boys, in whom the proportion may be from five to six per cent. These results, however, M. Guersent regards as merely approximations to the truth.

As constituting one of the forms of tubercular affection, tabes mesenterica is liable to be produced by all those causes which give rise to scrofula in general, such as a cold and damp residence, and insufficient or bad nourishment (to which last head, according to the opinion of many, must be referred the nursing of infants by a scrofulous, and particularly by a phthisical person), more particularly when these causes operate, singly or conjointly, on persons inheriting a scrofulous diathesis. It seems probable that those causes which determine the induction of tubercles in the mesentery, rather than in other textures of the body, operate through the intervention of the intestinal canal.

Tubercles may develop themselves in the mesentery in the progress of other diseases. We have already noticed in respect to fever, the frequent coincidence of inflammatory disease of the inner surface of the intestinal canal with similar disease of the mesenteric glands. In mesenteric tubercular tabes, also, the mucous membrane of the intestinal canal, particularly towards the termination of the small intestine, is pretty frequently found red and evidently inflamed on the patches where the mucous crypts are most developed. There are sometimes remarked in these situations, likewise, small, superficial, round ulcers, as well as traces of the cicatrices of such ulcers, which are easily recognisable by the manner in which the mucous membrane is wrinkled and radiated in the form of a star, towards a point that is thinner and darker than the others. Besides these small ulcers, deep ones are sometimes observable, attacking the whole thickness of the mucous, cellular, and muscular coats of the intestine, down to the peritoneum, which is itself sometimes ulcerated and perforated. These large ulcers are arranged in a circular form, and parallel to the transverse valves of the ileum. They are usually studded with fleshy, violet coloured, bleeding granulations, in the midst of which there are occasionally found small round tubercles, not advanced to suppuration, and adhering immediately to the internal surface of the peritoneal coat. But though these intestinal ulcers are of very frequent occurrence in mesenteric tabes, being observed in more than half of the persons affected with that disease, M. Guersent does not consider them to be essentially connected with the tubercular affection of the mesentery, or dependent upon it. Their independence seems to him to be established by the facts, that the mucous membrane of the intestinal canal is often found perfectly healthy in cases in which mesenteric tubercles have attained a great size, or are even partially softened; and that, on the other hand, intestinal ulcers are very frequently met with in phthisical subjects, without the mesenteric glands being diseased.

M. Louis informs us that of 202 persons dying of tubercular phthisis in whom he examined the state of the mesenteric glands, in twenty-three they were tubercular and enlarged. In all these cases ulcerations were found to exist in the small intestine. But though this author is disposed to believe that inflammation and ulceration of the mucous membrane of the small intestines should be regarded as an occasional cause of mesenteric tubercles in some cases, he is satisfied that there are others in which these tubercles occur independently of any such intestinal affection.

Dr. Home mentions that of eight cases of pulmonary consumption in which the mesenteric glands were found enlarged, three occurred in children, in whom the symptoms of the tabes mesenterica masked in a great measure the pulmonary affection; but when this complication occurred in adults, the tubercular mesenteric glands produced no symptoms.

Complications. The danger and incurability of tubercular diseases of the mesenteric glands depend on the diseases by which it is accompanied. M. Guersent professes himself not to be acquainted with a single case in which a child has died from this affection alone: in all the cases of the disease which he has seen prove fatal, it was combined with other diseases capable in themselves of producing this result. These diseases were sometimes chronic, sometimes acute. Among the former, the more common were chronic peritonitis, with or without sub-peritoneal tubercles, intestinal ulcers, and, in particular,

tubercular pulmonary phthisis. This latter disease, more especially, is so often combined with mesenteric tabes, that the mesenteric affection seems to be merely a sort of dependence of it. Out of four cases of mesenteric tabes, related by Baumes, in which examination was made after death, in three at least there were found to be tubercles or abscesses in the lungs. M. Guersent's observations at the Hôpital des Enfans Malades have furnished him with a still larger proportion of such cases. He has found bronchial or pulmonary tubercles in five sixths of the children affected with mesenteric tabes; so that, with a few exceptions in which the abdomen alone is diseased, most of those who die of tabes are at the same time affected with tubercular disease of the lungs; the rest die of some acute disease, or of chronic peritonitis, or intestinal ulcers.

Symptoms. The more indolent forms of mesenteric tabes are not indicated by well-marked symptoms. The functions of individuals so affected do not experience any kind of alteration, unless in consequence of the supervention of other diseases. M. Guersent, after quoting some striking illustrations of this fact from former authors, mentions that he has himself repeatedly found indolent mesenteric tubercles in children who had died of acute diseases, and in whom nothing had occurred during life to lead to the suspicion of their existence. Examples of indolent tubercles are certainly, he says, much more common in the lungs; but it is not the less certain that mesenteric tubercles may reach the last stage of softening, without sensibly affecting the health and without manifesting themselves by any pain, or other remarkable symptom. Persons in whom they exist may retain their appetite and plumpness, proving that the mesenteric glands are not the only channel by which the chyle may pass into the blood.

It is to the inflammatory form of mesenteric tabes, therefore, that almost all that has been written relative to the symptoms of this disease must be considered as applying, since the existence of the indolent form can be ascertained only by the examination of the dead body. But the diagnosis of inflammatory mesenteric tabes, at its commencement, is almost as difficult and as obscure as that of the indolent form. M. Guersent does not scruple to affirm, that notwithstanding all that has been said by writers upon this disease, the symptoms by which they pretend to recognise it are for the most part either uncertain or fallacious. At all events, so far as the diagnosis of inflammatory mesenteric tabes is concerned, we may recognise two different stages. In the first, the tuberculated glands are not large enough to be detected by manual examination. In the second period, whatever degree of uncertainty may attach to the other symptoms, the size of the tubercular glands often permits of their being felt through the abdominal parietes, so that there can be no longer any doubt as to the existence of the disease. M. Guersent mentions the following as the characters which have been assigned by authors to the first stage of mesenteric tabes:—1. Swelling of the belly; 2. Vomiting of a glairy fluid; 3. Diarrhœa, alternating with constipation; 4. Dyspepsia and irregularities in the digestive functions; 5. Milky urine; 6. Acid smell of the transpiration; 7. Paleness of the face, with a livid colour beneath the lower eyelid, &c. With this enumeration of symptoms we may compare that given by Dr. Joy:—1. Pain; 2. Constipation and diarrhœa, including the appearance of the alvine evacuations; 3. Enlargement of the abdomen; 4. Emaciation; 5. The character of the features; 6. The state of the tongue; 7. that of the appetite; 8. that of the pulse; 9. that of the skin and its secretions; and, 10. that of the mind. (*Cyc. Prat. Med.*, art. Tabes Mesenterica.)

M. Guersent, after passing in review the several symptoms that have been enumerated as constituting the physiological characters of mesenteric tabes, expresses his conviction that almost all the symptoms which have hitherto been assigned to this disease do not really appertain to it, but depend on several other affections of the abdomen, with which it is often confounded, or on other diseases which usually accompany it in its course. The only pathognomonic symptom, the only positive character by which we can recognise this disease,

and that only in its most advanced stage, is feeling the tubercles; all the other symptoms are more or less doubtful, and masked by those of the diseases with which mesenteric tabes is usually complicated.

Diagnosis. The diseases with which mesenteric tabes in *its first stage* is most liable to be confounded are chronic peritonitis, chronic inflammation of the small intestine, and intestinal ulcers. The following are some of the circumstances by which the diagnosis may be assisted:—1. The patient affected with tabes in the first stage, if old enough to express his feelings, complains almost continually of pain, the seat of which he refers to the middle of the belly, but which is never acute nor analogous to colicky pains, unless the tabes is accompanied with inflammation or ulceration of the intestinal canal. 2. The pain increases when pressure is made with a little force, about the lumbar vertebræ, and in a direction from behind forwards. 3. The pain is not superficial, and is not accompanied, like that of chronic peritonitis, with considerable tension of the belly, vomiting, and dulness; nor is it attended, like that of intestinal ulcers, with diarrhœa of grey and yellowish matters, and a peculiar alteration of the features. 4. The pain in tabes often continues for a very long time, and sometimes even for several years, without any other remarkable characters presenting themselves. 5. It recurs more especially in spring and autumn, at which seasons tubercular affections in general are liable to experience aggravation and inflammation, and it almost uniformly disappears during the heat of summer. 6. The alvine evacuations in tabes are more or less fluid and variously coloured, but they are never glairy and bloody, as in cæco-colitis and dysentery.

These characters belong almost equally to chronic inflammation of the small intestine and to tubercular mesenteritis; and as these two morbid states are most frequently found combined, and present common and analogous characters, it is almost impossible to distinguish between them. The circumstances on which such a distinction may be attempted to be founded, in cases in which these affections occur separately, seem to be that in chronic enteritis the smallest deviations from strict regimen almost always induce diarrhœa, and a slight increase of abdominal pain on pressure; whilst running, leaping, and hiccough, do not produce this last effect. But in inflammatory mesenteric tubercles, on the contrary, violent abdominal succussions increase the pain, whilst distension of the intestines, produced by errors in diet, does not aggravate the pain in any remarkable degree. Perhaps, even, the mesentery is less painful on pressure when the intestinal canal is full.

The general symptoms that present themselves in the course of tabes mesenterica, seem to be principally referrible to the other morbid affections with which it is usually accompanied; thus cough, fever, and emaciation, for example, when they occur in the progress of a case of this disease, often depend on pulmonary phthisis. Provided the other organs of the body retain their sound condition, the mesenteric glands may be crowded with tubercles, without the general health being thereby disturbed.

In the advanced stage of the disease there can almost always be felt, on a careful manual examination, hard, round, knobbed bodies, deep-seated, about the middle of the belly. The coexistence of chronic peritonitis, or of effusion, may prove impediments to the recognition of these glandular enlargements. Scybala in the intestinal canal have been sometimes mistaken for enlarged mesenteric glands, particularly in very thin persons; but even the most indolent tubercles, when they have attained a certain size, are always painful on pressure, whilst scybala on the contrary never cause pain. The difference in their position also should assist the diagnosis: tubercles usually occupy the ileo-cæcal and umbilical regions; scybala the left iliac fossa or hypogastric region. Such an error, too, is the less likely to happen, inasmuch as the latter stage of tabes is almost always accompanied with diarrhœa.

The general symptoms that have been assigned, by authors, to the latter stage of tabes mesenterica, viz. hectic fever, emaciation, swelling of the extremities, and effusion into the belly and other cavities, are none of them pe-

culiar to this disease, being met with in a number of other affections, pulmonary and intestinal, which are the usual concomitants of the mesenteric affection.

Treatment. To practitioners who regard as mesenteric tabes, in its first stage, every case of swelling of the belly attended with dyspepsia, flatulence, alternate diarrhœa and constipation, and emaciation of the extremities, it appears a matter of no great difficulty to cure that disease. These symptoms, which depend in some cases on simple intestinal derangement, in others on incipient chronic enteritis or peritonitis, &c. may disappear more or less speedily under the influence of the curative methods employed, evacuants, antiphlogistics, tonics, &c. according to the nature of the several cases. But to the practitioner who gives the name of mesenteric tabes only to those cases in which its actual existence is certain, it is by no means so easy to obtain a cure of this disease. M. Guersent is satisfied that in all cases in which the existence of mesenteric tabes is well ascertained, which it can only be by the touch, it usually proves fatal, not, as has generally been supposed, in consequence of the effects which result from the morbid degeneration of the glands themselves, but of those effects which necessarily arise from the diseases by which it is complicated.

M. Guersent conceives that in a case of indolent mesenteric tabes, sufficiently advanced to be recognised by the touch, but still uncomplicated with any other disease, benefit might possibly be derived from the resolvent means which are employed in strumous tumours in general, and in particular from those, the efficacy of which in the strumous affection of the mesentery has been so much boasted of by authors, such as the extract of cicuta, the acetate of potass, the protochloruret of mercury (calomel), the oxides of iron and ferruginous preparations, mineral baths and particularly sea baths; these means being seconded by enforcement of the regimen which is suited to other tubercular affections. But this author acknowledges that a case of this simple kind has never fallen under his own observation; and that it is from the success with which tumours evidently tubercular, seated in the neck, axilla, and elsewhere, are occasionally resolved, that he is disposed to admit the possibility of reabsorption or resolution of tubercles of the mesenteric glands, organs that are possessed of little sensibility, and the functions of which do not appear, notwithstanding all that has been said, to be very necessary to the preservation of life.

By the time it becomes possible to recognise the inflammatory form of tubercular degeneration of the mesenteric glands, and to distinguish it from other diseases of the abdomen, no remedy in general can be of any avail. The lungs, in almost every such case, have been for a length of time in a state of disease. The liver, the spleen, and the whole of the sub-peritoneal cellular texture have, in many instances, become affected with tubercles. The patient is tormented by hectic fever, and the mesenteric disease is then said to be in its third stage. The use of any of the pretended resolvent remedies under such circumstances would be injurious and dangerous,— it could only accelerate the fatal termination. The physician is reduced to the melancholy part of employing the same palliative mode of treatment as is suited to the advanced stage of pulmonary consumption, of tubercular peritonitis, or of intestinal ulcers.

An example of inflammatory mesenteric tabes, uncomplicated with any other affection, might by chance be met with. In such an event, the physician, after having combated the inflammatory symptoms by antiphlogistics, tepid baths, and strict diet, as in a simple inflammation of the mesentery, when the pain, diarrhœa, fever, and all signs of irritation have ceased, should treat the case as one of indolent tabes. "But here," says M. Guersent, "I strive to suppose curable cases; and I repeat, I have never met with any such, when no doubt could be any longer entertained as to the actual existence of the disease."

Participating, as we are constrained to do, in these unfavourable opinions relative to the curability of mesenteric tabes, we shall terminate the consi-

deration of the treatment of this disease with a simple enumeration of the various remedies, in the way of external applications and of internal medicines, which have at one time or other been employed in this disease, and of many of which the practitioner may be glad to avail himself in the various modifications and complications which it is liable to exhibit. We shall take this enumeration from the monograph by Dr. Joy already referred to:—*External applications,*—leeches; tepid, sulphureous, and cold baths; electricity; stimulant and anodyne frictions or plaisters; counter-irritation by tartar-emetic ointment, by croton oil, &c. *Internal medicines,*—purgatives and aperients; alteratives, including mercurials, antimony, guiacum, sarsaparilla, &c.; antacids, as the liquor potassæ, carbonate of soda, &c.; tonics, as iron, bark, bitters; and the so named deobstruents, such as muriate of barytes, burnt sponge, iodine, cicuta, &c.

DISEASES OF THE BILIARY ORGANS.

GENERAL VIEW OF THEIR CAUSES

Atmospheric heat.—Diet.—Bodily inactivity.—External injuries.—Alcoholic liquors.—Mercury.—Foreign matters circulating with the blood.—Mental emotions.—Diseases of other organs.

Before proceeding to the consideration of the special diseases of the biliary organs, we shall take a general view of the various causes in which they are known to originate.

1. The agent which seems to have most influence in producing diseases of the biliary organs is atmospheric heat, as is proved by their greater prevalence in hot than in cold or temperate climates, and in hot than in cool seasons in the same climate. Those who are exposed to the direct rays of the sun seem to be more particularly subject to hepatic affections, especially if this be followed by exposure to the night dews and malaria. Mr. Annesley calculates the average annual per centage of hepatitis in the East Indies to be at least treble what it is in the Western hemisphere, and he supposes the greater prevalency of this disease in the southern than in the northern provinces of India, to be in a great degree dependent upon the nature of the soil and climate, and the higher mean annual temperature. It appears from the statistical report on the troops in the West Indies, prepared from the records of the Army Medical Department and the War-office returns, that though diseases of the liver are by no means so common among the troops on that service as among those employed in the tropical regions of the Eastern hemisphere, they are nearly thrice as prevalent as among troops in the United Kingdom, and occasion about five times as high a ratio of mortality. They vary materially, both in prevalence and severity, at different stations in the West Indies, occasioning at Grenada, for instance, three times as much mortality as at most of the other islands, and that without any very apparent cause. In Jamaica, considering the high degree of temperature in that island, diseases of the liver are by no means very prevalent or fatal; and many parts of the island enjoy a remarkable immunity from them. It appears also from the statistical report, that the mortality in the West Indies from these diseases, is much less among the black than among the white troops.

Though cases of diseased liver are more numerous in hot than in temperate regions, they seem to be less varied in their nature. In India, the diseased appearances in that organ are generally confined to inflammation and its effects, suppuration or induration, while the different species of tubera, or hydatids, are by no means common. Some authors allege, that biliary concretions are seldom observed in the hepatic passages in India; but this is not conformable with the experience of Mr. Annesley, who states that they

frequently form in warm climates in the gall-bladder, and often produce inflammatory action in that receptacle, and in the cystic or common duct, not unfrequently attended with spasm. Mr. Twining also makes mention, in his work on the diseases of Bengal, of concretions in colour and consistence like yellow soap, extending along the biliary canals, through a considerable space.

It occasionally happens that some of the diseases of the liver assume an epidemic character. Dr. Chisholm mentions an affection of this description, under the name of anomalous hepatitis, which he witnessed in Grenada, and which he believed to be propagated in some degree by infection. A considerable number of instances have been recorded of the epidemical occurrence of jaundice. Thus Dr. Cleghorn mentions a slight jaundice without fever, which soon yielded to purgatives and saponaceous medicines, as having been a "common distemper in Minorca in July and August, 1745" (*Obs. on the Epid. Dis. of Minorca*); and Dr. W. Batt has described a similar affection (*Edin. Med. and Surg. Journ.*, vol. i. p. 107.) as occurring in Italy in 1792-3.

2. The quantity and quality of the food that is used are by no means unimportant, as regards the action and condition of the liver. An over proportion of animal food seems to favour an excessive secretion of bile, and there can be no doubt that variety and high-seasoned dishes exert a very prejudicial effect upon the liver, whether immediately or as temptations to excess in the use of animal food.

3. That persons leading a life of bodily inactivity, and those engaged in literary pursuits or other sedentary employments, are peculiarly liable to hepatic disease, seems to be very generally admitted. By some this has been attributed to the habit of leaning forward to which such persons generally yield, and the consequent pressure to which the biliary organs are subjected. But the more commonly received opinion is, that the want of exercise causes inactivity of the hepatic system, and thereby lays a foundation for derangement of the biliary organs. It is probable that the venous circulation of the liver is promoted by bodily exercise, and that by its neglect this circulation becomes proportionally languid.

4. External injury inflicted upon the region of the liver, independently of the mechanical effects of contusion and rupture, may give rise to different forms of diseased action in that organ. Its most frequent consequence, unquestionably, is inflammation; and traumatic hepatitis may pass through all the same stages as when it depends on internal causes. But a blow on the region of the liver is sometimes followed, at a longer or shorter interval, by the development of a simple serous or of an hydatid cyst, or perhaps of some other form of non-inflammatory structural alteration.

5. The influence of alcoholic liquors in inducing diseases of the liver has been much insisted on, both as respects tropical and temperate climates, with this difference, that in the former it is inflammation of a more or less acute character which is produced by this noxious agent, while in temperate climates fatal cases arising from this cause generally exhibit the granular degeneration. The belief that wine and spirituous liquors operate specifically in the production of liver complaints was opposed by Dr. Mills of Dublin, who affirms that persons who indulge freely in the use of these liquors are not the most subject to those ailments; that they occur in those who are temperate, and are found even in children and infants. It has been remarked also, that the troops stationed in Nova Scotia and New Brunswick suffer less from diseases of the liver than those at home, although, from the low price of spirits, there are few stations where the intemperance is greater. It may be observed too, that Sir G. Ballingall, while he conceives that, in India, affections of the liver are obviously, in a great majority of instances, the joint effects of climate and intemperance, acknowledges that in others we find them to be the result of climate alone. When originating solely from the latter cause, he adds, they are often very obscurely marked.

6. It is a well-established fact, that mercury, administered as a remedy, occasionally causes hepatic disease, which presents itself sometimes under the

distinct characters of hepatitis, and sometimes under the more obscure garb of jaundice. The first notice of this operation of mercury with which we have met, is contained in a letter by Dr. Sherwen, dated from the Ganges, in September, 1770. Dr. S.'s experience of this action of mercury was confined to a single case. Dr. Dick, who practised long in Calcutta, states in a letter to Dr. Saunders, that he has often observed chronic liver attacks succeed to long courses of mercury, undergone for the cure of venereal complaints. Dr. Cheyne, in the space of two years, met with three cases of jaundice produced by mercurials; and he had been creditably informed of its appearing in large venereal establishments during the exhibition of mercury. (*Dub. Hosp. Rep.*) Dr. Nicholl, when serving in India with the 80th regiment, occasionally observed hepatitis come on a few days, but often weeks, after a mercurial course for a venereal complaint; a great proportion of the soldiers who had been treated in this manner for syphilis suffered from inflammation of the liver; and in eight instances the same effect was produced by the exhibition of mercury, administered for the cure of chronic ophthalmia. Dr. Chapman, of Philadelphia, relates cases of a similar description, and ascribes the prevalence of hepatic complaints in his neighbourhood to the employment of mercury in the cure of autumnal fevers: he also states, on the authority of some old practitioners, that previously to the introduction of the mercurial practice into that district, hepatitis was scarcely known in it.

7. The occasional occurrence of abscesses in the liver, in cases of injury of the head, has long been noticed, and was at one time supposed to indicate the existence of a peculiar sympathy between the head and the liver, a doctrine to which we shall have occasion afterwards to advert. But, besides secondary abscesses, the liver is, as we shall presently see, very liable also to become the seat of secondary malignant growths, in whatever part of the body the primary disease may have developed itself. These facts would seem to imply that foreign matters, circulating with the blood, are peculiarly liable to be detained in this depuratory viscus, and suggests the inquiry whether any thing analogous can happen in respect of alcohol and mercury, when these exert a noxious influence upon this organ. In some interesting experiments of M. Cruveilhier, it was found that when mercury was introduced into the abdominal venous circulation, it was for the most part arrested and deposited in the liver, causing inflammatory action in that viscus; and that, on the other hand, when introduced into the general venous circulation, it was usually arrested in the lungs. These results, however, M. Cruveilhier acknowledges not to have been uniform, the mercury being sometimes deposited in other organs. Dr. Percy detected alcohol in the blood, the urine, the bile, and the liver, and it was separated from the latter with great facility, a circumstance which he thinks may account for the frequency of hepatic disease in drunkards. Andral had previously suggested that the alcoholic particles introduced into the alimentary canal, being carried directly to the liver by the meseraic veins, may in this way act as a direct irritant upon that organ. Whatever may be thought of M. Cruveilhier's views relative to the production of liver disease by substances introduced into the alimentary canal, it seems probable that in many cases it is on the mucous membrane of this canal that alcoholic liquors exert their first morbific effect, and that this is afterwards communicated, by extension, to the mucous membrane of the gall ducts, and the parenchyma of the liver. Dr. Saunders says, that in dram-drinkers the diseased structure may be traced from the stomach along the course of the ductus communis, and that he has frequently seen the gall ducts so contracted and thickened in such persons, that they could not transmit bile.

8. The influence of mental emotions over the biliary organs is illustrated by the occurrence of jaundice from a fit of passion, and by the sallowness and other symptoms of biliary disturbance that frequently attend hypochondriasis. Mr. Annesley remarks, that the depressing passions are not always to be regarded as symptoms, but in some cases as the cause of hepatic disease; and Dr. Wilson

Philip alleges, that not only does mental depression often instantly derange the functions of the liver, but that it seldom fails, if long continued, to affect its structure.

9. Affections of the biliary organs are liable to succeed to diseases of other organs, which may in such circumstances be regarded as standing to them in the relation of exciting causes. We shall, therefore, introduce here a few observations on these successions.

That the liver is liable to undergo morbid changes in the progress of fevers, especially those of a remittent and intermittent type, is attested by general experience. In nearly half the fatal cases of the typhoid fever of Paris, M. Louis found the liver in a state of softening. Dr. Davis found in the bodies of those who died subsequently to their suffering from the intermittent fever during the Walcheren expedition, that the liver was generally congested, and sometimes of a gelatinous consistence, and the portal system obstructed. But the affection of the liver accompanying fevers in hot climates, is often of a decidedly inflammatory character. Dr. Nicholl says, that in India acute hepatitis is frequently complicated with fever, as well as with dysentery or diarrhœa, but whether as the effect or as the cause he cannot determine.

That diseases of the biliary organs, dynamical perhaps at their commencement, and becoming structural in their progress, may take their origin from affections of the alimentary canal, and particularly of the duodenum, seems, both from anatomical and physiological considerations, to be extremely probable. M. Andral is disposed to concur in the opinion of Broussais, that in most cases of inflammation of the liver, there has been previous duodenitis. The observation of symptoms seems to him to favour this conclusion; and in some cases, the examination of the dead bodies of jaundiced persons has disclosed acute duodenitis as the only lesion. We have already referred to the general belief, that the primary morbific action of spirituous liquors is on the alimentary canal, and that continuous traces of disease may be observed extending from this canal to the substance of the liver, in persons addicted to intoxication. Ribes suggested (and Andral seems to have agreed in the opinion), that inflammation commencing in the intestinal canal may propagate itself to the liver, not only along the mucous membrane, but also along the veins. It seems not impossible that inflammation of the duodenum, without extending beyond the orifice of the ductus communis, may obstruct the flow of the bile, so as to occasion in the first place jaundice, and eventually organic disease of the liver. Dr. Stokes thinks that the dependence of hepatic affection on duodenitis is to be explained on a different principle; he supposes that the gastro-duodenitis acts sympathetically on the liver, but without exciting hepatic inflammation; and that the jaundice by which this affection is attended, is the result of a mere lesion of the innervation of the liver.

Dr. Marsh has adduced several cases to prove, that a long continued obstruction of the large intestines from an accumulation of scybala, occasionally causes jaundice; but he offers no explanation as to the modus operandi of this cause. It was long ago, however, suggested by Dr. Coe, that jaundice may depend upon the "duodenum being loaded with such contents as stop the orifice of the duct, or the colon being stuffed with hard fæces pressing upon the duodenum and ducts."

Dysentery is one of the diseases with which hepatitis is very liable to be complicated, particularly in tropical climates. Much doubt has existed as to the relations of these two diseases—which of them ought to be regarded as the primary, and which as the secondary affection, or whether they should be considered as parts of the same disease. Dr. Nicholl says, that in India he has sometimes seen hepatitis come on immediately after the subsidence of dysenteric symptoms; while, in other cases, weeks and months have elapsed before the appearance of hepatic symptoms.

We shall again have occasion to allude to the influence of diseases of the heart, and particularly of such as impede the emptying of the inferior vena

cava into the right auricle, in producing sanguineous congestion of the liver; a subject which has been especially considered by Corvisart. (See p. 177.)

We can easily understand that diseases of the *lungs*, by occasioning an impediment to the circulation of the blood, may act back upon the liver. Mr. Paisley, formerly head surgeon in Madras, particularly noticed this connection between diseases of the lungs and morbid conditions of the liver; and Dr. Powell has frequently observed the liver gorged and enlarged, of a looser texture, and softened, in examining phthisical patients, or such as from any cause had the lungs rendered less pervious than natural.

That fatty degeneration of the liver is a very frequent attendant on pulmonary consumption, seems to be well established, though of the nature of their connection it is impossible to suggest any explanation. Laennec remarks, that fatty infiltration of the liver is found in other chronic diseases, and even without any serious concomitant organic lesion; and he does not agree with Broussais, who believes it to be the consequence of inflammation of the duodenum. Of 49 cases of fatty liver which presented themselves to M. Louis's observation, 47 occurred in phthisical persons; so that, as he observes, it may certainly be considered as a dependency on that affection. He concurs with Laennec in refusing to recognise diseases of the duodenum as one of the causes of this morbid production, seeing that duodenal affections are very rare, and quite as infrequent among persons with fatty as among those with healthy livers. Dr. Home mentions, that of 65 cases of phthisis in which the liver was examined, in the Edinburgh Infirmary, in 10 it was in a fatty, and in 5 others in a waxy state. All these cases of diseased liver, except one, occurred in women. In 23 of Dr. Home's 65 cases, the liver exhibited different forms of the early stages of cirrhosis,—a morbid condition which is not noticed either by Louis or Andral as occurring in the liver of phthisical patients.

The frequent co-existence of diseases of the liver and of the brain was particularly noticed by Dr. Cheyne, who pointed out various cerebral affections, in which there is frequently coincidence of dynamical derangement, or of structural alteration of the liver. On the question of priority and succession in these two classes of diseases, Dr. Cheyne remarks, "that the brain should be suddenly affected in consequence of its connection with the liver, is not more remarkable than that the liver should be suddenly disordered from affections of the brain. Yet this last is an established observation. I am informed by a gentleman who has occasion to dissect a great many bodies, that, in diseases of the brain, he never fails to find the liver diseased, either as a cause or a consequence. The same gentleman assures me, that the liver generally discovers the marks of recent inflammation after fatal injuries of the head. Every surgeon knows that abscess of the liver is a common effect of injury of the brain."

Dr. Prichard, in referring to a statement of the late Mr. Todd, as quoted by Dr. Cheyne, that in every dissection he had made of cases of idiotism and mental derangement (amounting to upwards of 400), he had found the liver more or less diseased, acknowledges that, in his own practice, the instances have not been numerous in which organic disease of the liver, or other large viscera, has been discovered in conjunction with maniacal disorders. But of the conjunction of such diseases with epilepsy, he has seen a sufficient number of cases to conclude that there must be some sympathy or connection, depending upon some unexplained principle of pathology, between that morbid state of the brain which gives rise to epilepsy, and a diseased state of the liver, and other large viscera of the abdomen.

The liability of the liver to become the seat of abscesses, subsequently to the reception of injuries on remote parts, was first taken notice of in regard to injuries of the head. Paré mentions examples of this occurrence, and endeavours to account for it. Subsequently to his time, many similar cases were recorded by surgeons, and various explanations of this occurrence proposed. Some supposed that the matter of the abscess was originally formed within the head, and

in some way or other conveyed to the liver. In progress of time it was ascertained, 1st, that the liver is not the only organ in which abscesses are found subsequently to injury of the head; and, 2dly, that injury of the head is not the only form of remote lesion, which is followed by abscess of the liver or other organs; and hence it becomes necessary to look beyond any relation between the head and the liver, or between any other two portions of the body, in attempting an explanation of this phenomenon. Recent discoveries suggest the probability of the veins being the medium of communication between the seat of injury and the seat of the consecutive abscess, and that inflammation of the lining membrane of these vessels in the part injured, the consequent formation of pus, and its introduction into the circulation, are some of the steps of the process. But whether the pus thus formed in the seat of the primary lesion is, in some instances at least, simply conveyed to and deposited in the seat of the consecutive abscess, or whether it gives rise there, in all cases, to a new inflammation, in the course of which the abscess is formed, is a point which remains open for further investigation,—some pathologists at present inclining to the one, and some to the other, of these opinions. (See *Edin. Med. and Surg. Journ.*, vol. lii.)

FUNCTIONAL DERANGEMENTS OF THE BILIARY ORGANS.

General description.—Diminished biliary secretion.—Excessive biliary secretion.—Vitiated biliary secretion.—Impeded excretion of bile.—General view of the symptoms.—Treatment of functional derangements of the biliary organs.—Biliary concretions or gallstones.—Their symptoms and treatment.

As the peculiar functions of the liver and its appendages consist in the secretion and excretion of the bile, the functional derangements of these organs must obviously be referrible to an increased, a diminished, or a vitiated secretion of that fluid; or to its impeded, altered, or deranged excretion. These various disturbances of the functions of the biliary organs may, there is reason to believe, occur independently of perceptible alterations in their structure; or they may occur as consequences of, or at least in combination with, obvious structural alterations. But whilst the bile may undergo various morbid changes without apparent disease of its secreting organ, on the other hand, it may present, to all appearance at least, its natural characters, and be found in its usual quantity and situations, in cases in which there exists extensive structural alteration of the liver.

On what pathological conditions of the solids or fluids can morbid secretion of bile, in respect of quantity or quality, be supposed to depend? The following appear to be the principal morbid states to which such an effect can be referred: 1. those of the blood, out of which the secretion is formed; 2. those of the secretory apparatus of the liver, by which its formation is effected; 3. those of the nervous system, as influencing the biliary secretion, both organically and mentally; and, 4. those of other organs, more or less remote, which exert an influence over the secretory apparatus of the liver.

We can easily conceive that the blood may at one time contain more, and at another time less, than a due share of the principles which enter into the composition of bile, and that such variations in the composition of the blood may affect the quantity of bile produced. The amount of this secretion may also be supposed to be influenced by the quantity of the blood which reaches the liver, and the length of time that it remains there.

Any notion we can form as to changes in the condition of the secretory apparatus of the liver, capable of modifying the biliary secretion, must rest on the idea of secretion being, more or less, a process of filtration. Sometimes the

blood passes through the biliary apparatus, little if at all changed; and this circumstance favours the idea that modifications may occur in the state of this apparatus, capable of occasioning some variety in the physical and chemical qualities of the *bile.*

Without insisting on the general physiological doctrine of the dependency of glandular action upon the nervous system, we may remark, that various pathological phenomena lead to the recognition of an organic influence exerted by the brain over the biliary function in particular; but we shall find that it is not always very clear, whether it is the secretion or excretion of bile that is primarily affected in this manner.

Physiology seems to show that the duodenum is the organ, the varying conditions of which have the most immediate influence on the biliary function. The flow of bile into the duodenum is not constant, but occasional only, depending upon the presence of foreign matters in that portion of the intestinal canal: it is probable that where excretion is interrupted by any cause, secretion will be more or less arrested; and, on the other hand, that where excretion goes on with more than usual activity, a corresponding impulse will be given to secretion. Hence we can suppose, that under various morbid conditions of the duodenum, the biliary secretion may be affected at least in respect of quantity.

Before noticing more particularly the several modifications to which the biliary secretion is subject, we may remark, that a general belief in their frequent occurrence, and in their powerful influence in impairing the function of digestion, has led to the recognition of a class of maladies, termed Bilious, without the precise signification of this term having been very clearly defined. Some physicians seem to comprehend under it those diseases of the digestive organs that are attended with excess or redundancy of bile; others, those in which the bile is deficient or vitiated; while others extend it to all derangements of the digestive functions, attended with any form of biliary disorder. Nor has much discrimination been shown in distinguishing between cases of impaired digestion, actually depending upon deranged biliary secretion, and those referrible to other morbid states of the organs concerned in digestion; the terms "impaired digestion" and "deranged biliary secretion" being not unfrequently used as synonymous, as if the secretion of bile was the only condition upon which digestion depends. But when we consider how very complicated a phenomenon digestion is, it must be apparent that its disturbance is not likely always to depend upon the same cause, and that consequently the mere occurrence of indigestion is no positive proof of a morbid condition of the biliary secretion.

Diminished Biliary Secretion. The only positive means of ascertaining that there exists a deficiency of the biliary secretion, or (as some term this condition) the state of torpor of the liver, is by finding the fæces more or less pale, or of a dull white or ash-colour, in cases in which there is no evidence of mechanical obstruction to the flow of the bile.

There is a class of cases of great interest, in which some pathologists imagine that there occurs not only a diminution, but a suspension or suppression, of the biliary secretion. In these, jaundice occurs, although on post mortem examinations no disease of the liver, nor any obstruction to the flow of the bile, is perceptible, while the bile-ducts are absolutely empty. It is argued that the jaundice must in such cases be owing to the non-separation, from the blood, of the elements of which the biliary secretion is composed. The advocates of this explanation suppose that there is an analogy between this affection and that of the suppressed secretion of urine. In both, the supervention of coma implies the action of a poison on the nervous system. In ischuria renalis, urea is discovered in the blood, as it is in animals whose kidneys have been extirpated. In jaundice, the presence of bile in the blood cannot be doubted. To account for the rapid fatality of this species of jaundice, Dr. Alison has very ingeniously suggested that the economy sustains more injury from the excrementitious principles not being separated from the blood at all, than from their re-absorption subsequently to their separation and in this circumstance,

again, he finds an additional point of analogy between this form of jaundice and renal ischuria, which is a much more severe affection than where the urine is re-absorbed into the system after having been secreted.

When either diminished secretion or suppression of bile occurs as a dynamical affection, on which of the several pathological conditions recently noticed can it be supposed to depend? This is a question to which we are probably far from being able to give a satisfactory reply.

A deficiency of bile might be expected most usually to accompany structural alterations of the liver, when portions of that organ are more or less completely destroyed, or altogether removed. But experience shows that, in many cases at least, the secretion is carried on at its usual or even at an increased amount, when there exists very extensive disorganisation of the liver. It is alleged, that when the gall-ducts become impervious, the secretion of bile may cease, being no longer subservient to any purpose. Such a cessation may be supposed to depend immediately, either on the cutting off of the necessary stimulus to secretion derived from the duodenum, or on the pressure of the retained bile upon the secretory apparatus.

Excessive Biliary Secretion. Of the occurrence of an excess, as of a deficiency, of the biliary secretion, our principal means of judging must be derived from the appearances, and particularly the colour, of the alvine evacuations. This mode of judging is, however, sometimes fallacious; a small quantity of bile may be diluted with fluids in the intestinal canal, so as to give the appearance of copious bilious alvine evacuations; or matters existing in the alvine evacuations may be mistaken for bile, when in reality they are of a very different nature, as when they consist of blood more or less altered. "It is possible," observes Dr. Abercrombie, "that the bile may be increased in quantity, but it must at the same time be admitted that our prevailing notions on the subject are rather hypothetical, than founded on facts." "I am not aware of any tests, by which we can judge with precision of its redundancy in the alvine evacuations." Demonstrative proof of an increased biliary secretion is, however, frequently obtained in post mortem examinations. Andral has found the liver gorged, and the intestinal canal filled, with bile, in several cases of copious diarrhœa, in which this could not be attributed to suppressed excretion. The liver, with the exception of the engorgement, exhibited in these cases nothing unusual, but the mucous membrane of the intestines was inflamed and ulcerated; sometimes there was merely injection of its vessels.

It is very generally alleged, that an increased biliary secretion is a common consequence of an elevated temperature. Considerable ingenuity has been displayed in accounting for this fact, especially in respect of natives of a temperate exposed to the influence of a hot climate; to which exposure the increased secretion and all the derangements consequent upon this change of climate have been referred. According to one hypothesis, the increased biliary secretion in hot climates depends on a sympathy between the extreme vessels on the surface of the body, and those of the vena portarum; while others suppose it to depend upon a vicarious connection between the liver and lungs, which enables one of these organs to perform in part the functions of the other. It has been found, that the quantity of carbonic acid gas formed in respiration, in a given time, is much diminished by a high temperature, and by other circumstances which, as it is said, lower the powers of life. Hence, the excess of carbon must be carried off by some other channel than the lungs; and as bile is chiefly formed of carbon and hydrogen, an increased secretion of that fluid will guard the system against the superabundance of the former of these substances. To this cause, therefore, has been assigned the increased flow of bile in warm climates; and a similar explanation is offered of its occurrence from other causes, such as sleep, depressing passions, fatigue, stimulating drinks, &c. viz. that their primary effect is to diminish the quantity of carbonic acid gas formed in respiration.

As to the pathological conditions, out of which excessive biliary secretion may be supposed to arise, the explanation just given of its connection with an

elevated temperature obviously implies, that it may have its immediate origin in the condition of the blood, as containing a larger proportion than usual of the constituent elements of the bile, the presence of which may urge the liver to excessive action. Whether there be any other circumstances besides those already enumerated, in which such a state of the blood is engendered, seems to be a matter well worthy of investigation, particularly with reference to diet, and more especially the plentiful use of animal food. When jaundice occurs without deficiency of bile in the stools, we may conclude that there exists a redundancy of the biliary principles in the system. Increased biliary secretion may also proceed from altered states of the hepatic circulation; thus it may be excessive in hepatic congestion, and in the first stage of hepatitis. 2. It does not seem to be produced by any dynamical condition of the hepatic secretory apparatus. 3. May it be occasioned by any particular states of the nervous system, or by mental emotions? That a fit of passion has been succeeded by jaundice is well known, but the connection between these phenomena is very obscure. 4. Increased biliary secretion has usually been supposed rather to give rise to, than to depend upon, deranged action of the intestinal canal, as in the production of bilious diarrhœa and cholera.

Vitiated Biliary Secretion. That the bile is liable to undergo various modifications in its constituent elements, is shown by the diversities which it presents in its physical characters, as it is found in the gall-bladder and ducts in fatal cases; and is further confirmed by chemical analysis, the only satisfactory mode of ascertaining the nature of these modifications. The noxious influence which, in particular cases, the bile has been found to exert, when introduced into the system of a healthy animal, seems to afford an additional proof of its occasional vitiated constitution.

Impeded Excretion of Bile. The bile, subsequently to its secretion, may be prevented from entering the intestinal canal by a variety of mechanical impediments; but the gall-bladder and tubuli biliferi may also become distended with that fluid, without there existing any apparent obstruction to its flow. Some pathological facts seem to countenance the opinion that these latter cases depend on spasm of the ducts, such as that the attacks are frequently temporary, suddenly commencing and suddenly ceasing, and that they occur in nervous and hysterical habits. By some pathologists, however, the occurrence of spasm in the biliary ducts is regarded as a pure supposition, (Andral, *Clin. Méd.*, iv. 434.), and some imagine that if retention of the bile ever depends on spasm, it is the duodenum, and not the gall-ducts, that is the seat of the spasm. Some attribute the retention of the bile in cases in which the ducts exhibit no mechanical obstruction, to preternatural viscidity of that fluid itself; others think that this viscidity, when it exists, is more probably the consequence of the bile's detention.

When from any cause the bile has been obstructed, it is very commonly reabsorbed into the system, and being deposited in the different textures of the body produces the state denominated jaundice. But cases are recorded, in which a great accumulation of bile has occurred in the gall-bladder, proving its regular secretion, while the evacuations have been destitute of colour, and yet no jaundice has manifested itself. In some instances of this nature, the accumulated bile has even formed a tumour externally, with an evident fluctuation, and such a tumour has been punctured under the idea that it contained purulent matter.

Symptoms of functional derangements of the biliary organs. It is obvious that, in judging of the existence or non-existence of functional derangements of the biliary organs, we must be guided in a great measure by the appearances of the alvine evacuations. It being understood that their qualities, and particularly their colour, are regulated by a due admixture of healthy bile, any changes of this fluid in respect of quantity or quality, may be expected to influence their appearances.

From the characters of the alvine evacuations in cholera and in bilious diarrhœa, these affections have usually been regarded as indicative of an excessive biliary secretion; but of late years, pathologists have been led to suspect that this doctrine rests on insufficient grounds. "I must confess my suspicions," says Dr. Abercrombie, "that the term *bilious stools* is often applied, in a very vague manner, to evacuations which merely consist of thin feculent matter mixed with mucus from the intestinal membrane." Mr. Tytler, Dr. Holland, and others, seem to entertain similar views.

The dark or black appearance of the alvine evacuations, usually termed *melæna*, was formerly regarded as depending on vitiated bile. It is now, however, understood that this condition of the stools is generally caused by a morbid exudation from the intestinal mucous membrane. The liability of such discharges to be mistaken for vitiated bile, is increased by their frequent occurrence in structural diseases of the liver, which Mr. Langstaff attributes to a morbid sympathy between the liver and intestines, but which is probably referrible to congestion of the portal venous system. From the appearance, however, which the bile occasionally exhibits in the gall-bladder, it seems reasonable to suppose that, in some instances at least, inky or pitchy stools may derive their characters from that fluid.

Another appearance of the alvine evacuations not unfrequently observed, and supposed to indicate deranged biliary secretion, is that usually designated as green or greenish stools. Some writers on bilious affections attribute this colour to the action of some acid matter on the bile, subsequently to its entrance into the intestinal canal. Several practical writers, however, believe that this appearance of the evacuations is attributable entirely to a peculiar morbid secretion from the intestinal canal, and that the bile is not concerned in its production. This is a subject which seems to deserve fuller investigation than it has yet received.

When the alvine evacuations exhibit a white colour, this is generally in connection with the state of jaundice; and may be regarded as indicating the existence of some obstruction to the passage of the bile into the alimentary canal, and its consequent re-absorption. But white stools have also been observed in some cases in which jaundice did not exist. The most probable explanation of the occurrence of white stools, in cases of this last description, seems to be, that the blood is deficient in the biliary principles; for if they depended upon functional derangement of the liver itself, the biliary principles would remain in the blood, and give rise to jaundice. Dr. Coe supposes that, in some cases, the white stools depend upon a morbid condition of the bile, by which its yellowness is destroyed, and he alleges that the same effect (viz. white stools) may be produced by the detention of the bile in the gall-bladder, when, from some peculiar state of the coats of that receptacle and the ducts, or from viscidity of the bile itself, it cannot make its way into the blood.

Treatment of functional derangements of the biliary organs. The foregoing view of the simple functional or dynamical derangements of the biliary organs suggests the following indications of treatment, as applicable to the several forms: 1. to diminish biliary secretion when excessive; 2. to increase this secretion when deficient; 3. to correct it when vitiated; and, 4. to promote the excretion of bile, and the removal of spasm of the biliary passages.

The first indication then to be considered, is that of diminishing the hepatic secretion when it is in excess. Independently of any specific power which is attributed to mercury in this respect, — a matter hereafter to be considered, — it is only by avoiding the occasional causes of increased biliary secretion that this indication can be fulfilled, viz. by avoiding exposure to high temperatures, and by diminishing the quantity of animal food. The efficacy of these measures may depend either upon their modifying the qualities of the blood, or on their removing vascular congestion. If the excessive biliary secretion seems to

depend upon a morbid condition of the alimentary canal, it is obvious that the attention of the practitioner should be in the first place directed to its correction.

The second indication, that of increasing the biliary secretion when it is deficient, is supposed to be effected by a class of medicines that have been denominated Cholagogues, respecting the exact mode of operation of which a great diversity of opinion exists. The remedy of this kind on which most reliance is placed by British practitioners, is undoubtedly mercury, and we shall afterwards find that its efficacy is supposed to depend, by some, on its possessing a specific power of directly stimulating the biliary apparatus, while others attribute its effects on the liver to its action on the intestinal canal as a purgative.

In connection with this indication, we may consider the question whether medicine affords any means of counteracting the injurious effects arising from a deficient secretion of bile, so long as this continues. There are obviously two ways in which such a deficiency may act injuriously on the economy. The one, depending upon the absence of bile from the situations where it is usually met with, is limited to the function of digestion; the other, depending on its presence in unusual situations, extends to the general economy, and particularly affects the functions of the nervous system.

If we were acquainted with the precise purpose which the bile fulfils in the function of digestion, we should be assisted in judging what aid medicine can afford for remedying its deficiency. Those who suppose that its action consists in correcting acescency, may imagine that its place may, in part at least, be supplied by alkaline remedies. Those who conceive that the bile promotes digestion, by stimulating the peristaltic motions of the intestines, must consider purgative medicines as the proper substitute for its deficiency. Leaving out of view such speculative judgments, and looking only to the results of experience, we find that the most beneficial treatment in cases of deficient biliary secretion consists in, 1. the careful regulation of the diet, so as to render it as easy of digestion as possible; 2. the administration of bitter tonics; and, 3. of laxative or purgative medicines, so as to keep the bowels gently open. "The temporary defect of bile," says Dr. Saunders, "may be supplied by various bitters, occasionally united with rhubarb, aloes, and the like."

Whatever may be the purpose of the bile as a secretion, it cannot be doubted, that the formation of this substance is not of less consequence as an excretion that secures the elimination of some principles noxious to the system. When, therefore, the bile either is not secreted, or is re-absorbed after being secreted, have we any means of correcting its injurious effects? Little, we believe, in the way of palliation, is in our power in this respect. In the very small number of cases in which an attack of coma, supervening on jaundice, has been successfully combated, the benefit seems to have been derived from purgatives, and such applications to the head as are suggested by the apprehension of inflammation of the brain.

The third indication is to correct the biliary secretion when vitiated. The degree of control over the acid or alkaline character of the urine, which has been derived from a more accurate knowledge of the morbid states of that fluid, has excited hopes of similar success, with regard to the vitiations to which the various glandular secretions are subject. It must be admitted, however, that the knowledge we at present possess of the biliary secretion in health and disease, does not enable us to lay down any rational indications for the correction of its morbid conditions, with the exception, perhaps, of the treatment required in cases of biliary concretions, which will be presently noticed.

The fourth indication of treatment which we have specified, is that of promoting the excretion of the bile, and the removal of spasm of these canals, supposing them to be muscular. When the bile is accumulated in its passages,

in consequence of the torpor of the powers by which it is naturally propelled, or of some slight mechanical obstruction, the administration of emetics, by calling into action the diaphragm and abdominal muscles, and thus compressing the liver, may effect this indication. When by such means the bile is thrown into the alimentary canal, its easy passage is promoted by the copious use of diluents, with or without laxative medicines. "In general," says Dr. Saunders, "bile is a purgative sufficiently stimulating for its own evacuation, only requiring the assistance of warm water for facilitating its discharge. If however, in some cases, it irritates without purging, I would recommend the use of small doses of the neutral salts, such as soluble tartar, sal catharticus amarus, and the like, and in all cases they do most good under dilution."

Biliary Concretions, or Gall-Stones. As connected with the variations to which the physical and chemical constitution of the bile is subject, we next proceed to the consideration of gall-stones. According to Andral, these concretions may, in respect of their chemical composition, be referred to four heads:— 1. Those composed of the yellow matter of the bile; 2. Those consisting of the resinous matter; 3. Those consisting of picromel; and, 4. Those of cholesterine. Chevreul and the late Dr. Turner agree in stating that the most common constituents of gall-stones are the yellow colouring matter of the bile, and cholesterine; the latter generally predominating, and being sometimes in a state of purity, but sometimes wholly wanting. Sometimes gall-stones contain a portion of inspissated bile; and most cholesterine gall-stones have inspissated bile for their nuclei.

The formation of calculi consisting of inspissated bile may be dependent either on original spissitude of the secretion, or on its accidental detention in the gall-passages, favouring the absorption of its watery particles. But when cholesterine concretions are formed, we must either suppose that the bile contains this principle in excess, or (as Muratori suggests) that there is a deficiency in the bile of the element on which the solution of its cholesterine depends, viz. soda. Dr. Bright has observed, that concretions of adipocire are frequently deposited in the gall-bladder, in patients labouring under scirrhus.

But besides true gall-stones, concretions composed of phosphate of lime are occasionally found in the gall-bladder. In two instances of this kind observed by Andral, the cystic duct was obliterated.

Gall-stones may form in all parts of the biliary passages. Most frequently, however, their first formation takes place either in the tubuli or in the gall-bladder, and they are subsequently conveyed from these into the larger ducts, where they increase in size. In whatever portions of the biliary passages they are formed, they may be driven onwards, by the flow of the bile, to the gall-bladder or to the duodenum.

The number and size of biliary concretions vary considerably. Sometimes a single calculus fills the whole gall-bladder; while, in other instances, that sac contains several thousands, of minute dimensions.

It is obvious, that the effects of a biliary calculus as regards the excretion of the bile, must be greatly modified by its situation. If it is lodged in the cystic duct or in the gall-bladder, the bile will continue to enter the duodenum; but if in the hepatic or the common duct, the passage into the duodenum will be closed. A small calculus lodged in the ampulla formed by the union of the biliary and pancreatic ducts, may occasion complete retention of the bile, while a much larger calculus lodged in a more dilatable portion of the passages, may allow the bile to pass between it and the parietes of the duct.

Biliary calculi of large dimensions are sometimes voided by stool, or found after death in the intestinal canal. With regard to these, it may be questioned whether the gall-ducts are capable of such distention as to have allowed them to pass; or whether they have acquired their large size subsequently to their reaching the intestines; or whether they have been formed exclusively in the biliary passages, and entered the intestine by some preternatural route. It is not probable that a biliary calculus can receive any addition from the bile after

reaching the alimentary canal, though it is conceivable enough that such a calculus may form the nucleus of an intestinal concretion. That biliary concretions sometimes reach the intestinal canal by a perforated aperture of communication, does not admit of doubt; many cases being recorded in which adhesion and ulceration have taken place between the gall-bladder and the duodenum, by which an opening has been effected sufficient for the passage of a large calculus; in other cases, the gall-bladder has in the same manner formed a communication with the ascending colon.

In some cases, biliary concretions are discharged externally, by producing abscess and ulceration of the coats of the biliary passages, particularly of the gall-bladder, and of the parietes of the abdomen. (Soemmerring, *De Concrement. Bil. Corp. Hum.*, 1795.)

Symptoms. When biliary calculi block up the ducts, they give rise to the train of symptoms comprehended by nosologists under the term jaundice, consisting particularly in yellowness of the skin, whiteness of the stools, and muddy redness of the urine. The state of jaundice, however, may arise from various other conditions of the biliary organs, some dynamical and others structural, as will be afterwards shown, and cannot therefore be held as conclusive evidence of the existence of calculi.

The existence of gall-stones is frequently attended with fits of pain of greater or less intensity, and of longer or shorter continuance; but this is by no means invariably the case. On the contrary, in a large proportion of cases, the existence of biliary concretions remains unknown till revealed by *post mortem* examination. In considering the presence or absence of pain in the hepatic region as a diagnostic character for determining the existence of biliary concretions, it is necessary to keep in mind the three different situations in which these bodies may exist, viz. 1. the gall-bladder; 2. the gall-ducts; and, 3. a passage formed by ulceration between the gall-bladder or ducts, and the intestinal canal.

Biliary calculi may remain in the gall-bladder, without occasioning pain, or any other symptom, and have frequently been found, in that situation, in dead bodies when their existence was unsuspected during life. Sometimes, however, they occasion a dull pain, which may increase on motion or after food, and in some instances the pain is very severe.

The pain which usually attends the passing of a biliary concretion along the gall-ducts, is often intense. It is generally seated in the pit of the stomach, extending to the right hypochondrium and back, and recurring in frequent paroxysms like labour pains. The sufferings of the patient are of the most acute and agonising description. Intervals of comparative ease succeed these paroxysms, but there generally remains a dull, obtuse pain in the epigastric region, from which those of the more acute character appear to proceed. Of the circumstances influencing the degree of pain which accompanies the passage of a gall-stone along the ducts, the most obvious is the size of the calculus, occasioning a proportional degree of distention in the biliary ducts; but besides this, it has been supposed that the ducts are capable of spasmodic contractions, in consequence of which intense pain may proceed from the passage of a calculus by no means considerable. When an intense degree of pain occurs in the hepatic region as a consequence of inflammatory action, we may expect it to be accompanied by febrile excitement, a symptom which is not present in spasm of the gall-ducts. Hence, as Dr. Pemberton remarks, the more exquisite the pain is, provided the pulse is below 100 in a minute, with the more confidence may we rely on this diagnostic symptom. The simultaneous occurrence of perspiration affords another presumption that the pain is not the consequence of inflammation. "The severity of the pain is so extreme," says Dr. Bright, in speaking of the passage of gall-stones, "as to bring on a state of the greatest exhaustion, and reduce the pulse below the natural standard, both as to strength and frequency, or still more often to render it rapid and weak, while the hands and the whole surface are bedewed with a cold perspiration."

Where calculi have passed from the biliary passages into the intestinal

canal, by perforating their respective coats, there seems reason to believe that the whole of this process has been effected without the production of any considerable degree of pain.

When biliary concretions have found their way into the intestinal canal, they are, in a large proportion of cases, discharged with the evacuations. Cases occur in which all the symptoms of ileus manifest themselves, but abate or cease simultaneously with the discharge of a gall-stone from the intestinal canal. In some fatal cases of ileus from gall-stone, the calculus has been found in the gall-ducts (*Abercrombie*, p. 363.); in others, in the intestinal canal (p. 125.). Cruveilhier mentions a case, in which one calculus was found in the jejunum (above which, the alimentary canal was distended with a brownish yellow fluid); and another was fixed in an ulcerated communication between the gall-bladder and duodenum. Sometimes the ileus appears to depend upon an agglomeration of several calculi causing obstruction of the intestinal canal.

Treatment. The indications referrible to this head seem to be the prevention and solution of biliary concretions, so far as these are objects which it is in the power of medicine to promote, and the facilitating their passage along the ducts.

The prevention of the formation of biliary calculi must obviously depend mainly on avoiding the causes of their production. It has been alleged, however, that the long-continued use of alkalies renders the bile less disposed to concrete, and even effects the softening and the solution of concretions already formed.

Those agents which have been found capable of dissolving biliary calculi out of the body, have, at different times, been recommended as proper for internal administration in cases in which gall-stones are supposed to exist. Of these, the medicine which, in its day, acquired the widest reputation, was a combination of sulphuric æther with spirit of turpentine (two parts of the former with three of the latter), administered at first in a very small dose (two scruples). This remedy, originally recommended by Durande, a physician of Dijon, has also been much commended by Soemmerring, Richter, and others, who unhesitatingly attribute to it the property of dissolving biliary calculi; while those who do not acknowledge its possessing such a power, admit that the remedy of Durande occasions, or at least facilitates, in certain cases, the expulsion of those concretions; which beneficial operation they suppose it to effect by calming the spasm of the parts containing them. (*Bricheteau.*)

We are next to inquire how the passage of biliary concretions through the gall-ducts may be facilitated. Our views on this subject must, of course, be influenced by our opinions as to the causes which retard or propel a biliary concretion in its course; whether we suppose the resistance to arise from the physical coherence of the coats of the ducts, or from their spasm; and whether we suppose the power by which the resistance is to be overcome, to be the muscular contraction of the ducts themselves, as some imagine; or, as is conceived by others, the compression of surrounding parts; or, as has also been suggested, the pressure of a fluid accumulating, by continued secretion, behind the obstacle.

The measures which in practice have been found most efficacious in fits of gall-stone, are the administration of opium, the warm bath, and warm fomentations, emetics, and sometimes bloodletting.

The beneficial effects derived in this class of cases from the administration of opium and other narcotics, has been considered a strong argument for attributing the detention of the gall-stones to spasmodic contraction of the ducts. It has been suggested, however, that narcotics, if they allay spasm, must at the same time put a stop to any muscular power by which gall-stones can be supposed to be propelled. But whatever antispasmodic influence may be exerted by opium upon the gall-ducts, its power in relieving pain is undoubted, and with this intention it must be administered during the fit of gall-stone, and that in very considerable quantity. Dr. Pemberton says that it should be given until the pain abates; and that, till that object is obtained, the patient should

take a grain of solid opium, or 25 drops of laudanum, every hour. A starch and laudanum glyster (40 minims of Tinct. Opii in 4 oz. of starch gruel), repeated every six or eight hours, will frequently produce immediate relief.

Immersion in the warm bath, and warm fomentations, or clysters of warm water, are recommended in a fit of gall-stone, in the belief that they tend to diminish the force of muscular contraction, and thereby facilitate the passage of the stone. Dr. Powell recommends that the bath should be of the temperature of 100° to 110°, and that the immersion should be continued until faintness comes on, which is the best criterion to regulate its duration, since, where faintness has not followed, the bath has not seemed to have any good effect. It may be repeated according to the violence of the symptoms, and the feelings of the patient. M. Bricheteau speaks very favourably of the application of bladders of pounded ice to the epigastrium, with a view to allay the severe pain attendant on this affection. In several cases, he found that the paroxysms were stopped by this means, after the ordinary methods of treatment had failed.

When the stone is arrested in the biliary ducts, bloodletting may be requisite for the removal or the prevention of inflammation. But the intention with which it is employed in these cases is generally similar to that with which the use of opium and of the warm bath is recommended, viz. to produce relaxation. The quantity of blood to be taken must depend upon the peculiar circumstances of the case.

The administration of emetics during a fit of gall-stone has been recommended, partly on the idea of their contributing to produce muscular relaxation, and partly from their exciting the action of the abdominal muscles, in the manner already alluded to. Among the advocates for their use may be mentioned Dr. Coe, Dr. Heberden, and Dr. Saunders. The latter recommends their employment in small doses, so as to create nausea for some time before their emetic effect is produced. "For the same reason," he observes, "tobacco deserves a trial, as the sickness which it occasions resembles sea-sickness more than any other, and it is probably on this principle that sea-sickness has been so very efficacious in those cases." Dr. Powell's experience is unfavourable to the use of emetics. Dr. Pemberton suggests that "the effect of an emetic is not only to produce relaxation of the whole body, but also to increase the secretion of bile. This increased quantity of bile, if its exit be prevented, will mechanically increase the distention of the duct, and thus will a passage be opened for the calculus. But if the stone, in consequence of its angles, does not completely close the ducts, the bile will pass off, and no distention take place."

When gall-stones give rise to symptoms of ileus, the means to be employed for overcoming the obstructed state of the alimentary canal must be the same as when this state arises from other causes. Indeed, it often happens in cases of this kind, that we are ignorant of the immediate cause of the symptoms, till the case terminates, favourably by the discharge of the concretion, or fatally in death.

DISEASES OF THE BILIARY PASSAGES.

Glands of gall-ducts. — Their enlargement. — Inflammation of the mucous membrane of the gall-bladder, ducts, and biliary tubuli. — Collections of pus. — Ulceration and perforation of the gall-bladder and ducts. — Contraction. — Distention of the gall-bladder, various causes of. — Symptoms and treatment of diseases of the biliary passages.

In this section we shall consider the structural alterations to which the biliary passages, viz. the tubuli biliferi, the gall-ducts and the gall-bladder are liable.

1. The most common of these is the presence of gall-stones, the composition and mode of formation of which we have already noticed. We allude to them at present simply as foreign bodies, occasioning, in the first place, more or less impediment to the flow of the bile; and, secondly, tending to give rise to more

or less acute inflammation of the biliary passages, in all parts of which these concretions form.

2. The attention of pathologists has lately been directed by Mr. Twining to an organic affection which seems to prove not unfrequently the cause of obstruction to the bile in its passage to the duodenum, viz. the development of tumours, varying in size from that of a grain of barley to that of a bean, in the capsule of Glisson. "Two small bodies," this writer states, "are always to be found by careful dissection, which, from their structure, appearance, and uniformity of situation, I am inclined to believe are absorbent glands. One of them is situated near the termination of the gall-bladder in the cystic duct; the other at the upper part of the ductus communis choledochus. Enlargement of these bodies, with inflammatory excitement about the capsule of Glisson, may cause closure of the biliary ducts. I have found the ducts obliterated exactly at the point where these enlarged glands were causing pressure. If my view of the influence of these parts be correct, we shall have a satisfactory explanation of one mode in which transient obstructions to the flow of the bile into the intestine are produced from temporary irritation of these glands on the occasion of disorders in the vicinity; and we see a distinct reason for obliteration of the cystic or of the common duct, in the chronic disease of old drunkards, which is just the description of subjects in whom the closure of the ducts most frequently takes place."

3. The mucous membrane of the gall-bladder and of the large biliary ducts is liable to attacks of inflammation, either acute or chronic, occasioning its vascular turgescence and general swelling from serous or other effusions, and, when the inflammation is chronic, its more permanent thickening and induration. The inflammation may either be circumscribed, or it may spread over the whole inner surface of the ducts and gall-bladder. It has been alleged that, in these cases, the inflammation spreads from the duodenum into the biliary passages. May it in any case be derived from, or be extended to, the substance of the liver? In acute inflammation of the gall-bladder (cholecystitis), the substance of the liver is said to be almost always red; and in the chronic form of this affection, it is not uncommon to find abscesses or tubercles and other degenerations in the liver. The mechanical obstruction produced by inflammation and swelling of the mucous membrane of the biliary ducts will, it is obvious, affect the flow of the bile, in precisely the same manner as a calculus occupying the same position.

Inflammation may also occur in the mucous membrane of the smaller biliary tubuli, and it seems probable that to them, at least, inflammatory action in the substance of the liver will be readily communicated. Cruveilhier has repeatedly found cysts containing concrete bile, in the livers of new-born children. He regards these cysts, which he suspects to have been often taken for tubercles, and which may acquire a considerable size, as the consequences of adhesive inflammation of the biliary tubuli.

It very seldom happens that inflammation of the mucous membrane of the gall-bladder terminates in purulent effusion: but in a few cases this has occurred, generally from the irritation of biliary calculi. Ulceration of this membrane may take place as a consequence of the same cause. Sometimes the ulceration consists of simple erosion only. Sometimes it goes on to complete perforation. It may be either confined or extended, or there may be a number of distinct ulcers in different portions of the sac. If perforation occur, without previous adhesion of the gall-bladder to the adjacent parts, the bile is effused into the cavity of the abdomen, giving rise to fatal peritonitis; but in many cases, such adhesion has taken place before the whole thickness of the coats is destroyed.

The parietes of the gall-ducts, in like manner, may be softened, ulcerated, and ultimately perforated; and this last event will of course be followed by effusion of bile into the cavity of the peritoneum. The perforation of a gall-duct, as Andral observes, sometimes happens behind a point where the duct is ob-

literated, either in consequence of disease of its coats or of the lodgment of a gall-stone.

It is probable that many of the morbid alterations to which the coats of the gall-bladder are subject, as, for example, the formation of cartilaginous or bony plates, or of earthy or stony concretions, originate in the sub-mucous or sub-peritoneal cellular coats. Appearances have sometimes been met with, which would lead to the belief that inflammation had had its primary seat in the sub-mucous cellular coat, and either remained confined to that coat, extending over a smaller or larger portion of it, or spread to the membranes on each side. Serous effusions into the cellular inter-coats have been observed to such an extent, as to add considerably to the thickness of the parietes. Louis mentions, that of seventeen cases of diseased gall-bladder which had fallen under his observation, in two the sub-mucous membrane was hard, thick, and scirrhous, in another case it was merely thickened. Whatever be the nature of the coat which is interposed between the sub-mucous and sub-peritoneal cellular membranes in the state of health, it is certain that, in some cases of disease, the existence of muscular fibres in that situation does not admit of doubt: Louis states, that in one of his cases, in which the mucous membrane was destroyed throughout a great extent, there were found beneath the sub-mucous cellular coat, fibres of a muscular appearance, resembling those of the fleshy coat of the stomach; and Andral notices the appearance of muscular fibres in the coats of the gall-bladder, as one of the changes which it is liable to undergo in hypertrophy.

4. In the healing of ulcerations of the mucous lining of the gall-bladder and ducts, greater or less contraction of their parietes is liable to occur, producing shrinking in the bladder, and in the ducts stricture or closure, or occlusion, as it has been lately termed. M. Louis mentions eight cases of obliteration of the gall-bladder near its neck. In five, there was more or less affection of the mucous membrane, and in these the gall-bladder was very diminutive, containing a very small quantity of mucus or pus. In the other three cases, the gall-bladder, not having experienced ulceration, was of considerable size, and distended with a fluid resembling the white of egg. In nine other cases of diseased gall-bladder, there was more or less alteration of the mucous membrane; and in two of these, its size was diminished. From M. Louis's results, it would appear that the number of cases in which obliteration at the neck of the gall-bladder is accompanied with, and independent of, calculi, is nearly equal.

But diminution of the gall-bladder, besides proceeding from ulceration of its lining membrane, may, Mr. Twining conceives, arise from inflammation of its external surface. This author states, that in India, the gall-bladder is commonly distended with bile in persons recently arrived, so as to produce enlargement and deepening of the sulcus in which it is lodged. As a consequence of this distention, inflammation of its serous surface is induced; this is followed by effusion of coagulable lymph, which, contracting as it becomes organised, ultimately compresses the gall-bladder to less than its natural dimensions. In many cases, in which inflammation of its serous covering has occurred, the gall-bladder is agglutinated by false membranes to the adjacent parts, and membranous bands are sometimes formed between it and the duodenum, that produce considerable constriction of that intestine, and give rise to symptoms which simulate those of organic disease of the pylorus. Diminution in the size of the gall-bladder may also arise from other circumstances. Thus, when from any cause the bile does not reach the gall-bladder for a considerable period of time, a diminution of its capacity takes place. The state of its coats in these cases is very various, sometimes being so soft and thin that they tear on being touched, and at other times thickened, and harder than natural. It seems to be under circumstances such as have been just alluded to, that the gall-bladder occasionally undergoes what is called a cellular transformation. Richter found, in the body of a woman who died in a most intense degree of jaundice, that the gall-bladder was wanting, and in its

place there was merely a membranous substance, without a cavity, and of the circumference of a sixpenny piece. And Andral mentions a case in which, a man having died some months after biliary calculi had been discharged externally by an abscess opening in the side, no trace of the gall-bladder could be found; there being nothing in its sulcus, except a mass of cellular tissue of considerable density. From the choledoch canal there arose a duct which resembled the cystic, but could not be traced beyond a few lines, terminating interiorly in a cul-de-sac, and losing itself in the cellular tissue.

5. Distention of the gall-bladder may be produced by an accumulation either of bile, or of fluid secreted from its internal surface. In some instances the bile is accumulated in this cavity, in consequence of some obstruction to its passage into the duodenum; but in other instances the accumulation occurs independently of such obstruction. The gall-bladder has sometimes been found to contain twelve pounds and upwards of bile, its dimensions being, of course, protionally increased. In such cases the distended gall-bladder extends beneath the margin of the liver, and produces a fluctuating tumour, which can be felt through the integuments. Such a tumour is apt to be mistaken for hepatic abscess.

When, from impaction of a concretion, or any other cause, the passage of bile from the liver into the gall-bladder is prevented, this receptacle, as Dr. Powell observes, is not in general found empty, but distended to about its usual size, or somewhat more, by a thick colourless mucous fluid, which is commonly coagulable by heat, by acids, and by alcohol, and which, except that the coagulum is firmer, very accurately resembles serum. This fluid is freer from the admixture of bile, in proportion to the duration of the obstruction, and it appears to be the unmixed secretion of the internal surface of the gall-bladder.

A mechanical obstacle to the flow of bile into the intestines may occasion dilatation of the biliary tubuli, more particularly if, from the obstacle being in the hepatic duct, the entrance of the bile into the gall-bladder is prevented.

We have recently alluded to the circumstances under which an accumulalation of pus may occur in the gall-bladder, producing its distention.

In a case related by Simmons, a tumour, occupying principally the left side of the abdomen of a woman, was found to be formed by an immense sac, containing sixteen measures full of hydatids of various sizes, which sac proved, on examination, to be the gall-bladder. Walter also once met with hydatids in the cavity of the gall-bladder.

Several instances are recorded, in which the gall-bladder has been found greatly distended with air, but we are not aware of this form of pneumatosis having ever been recognised during life.

Symptoms. The symptoms connected with structural diseases of the biliary passages must obviously be such as depend, 1. on the existence of inflammation in the membranes of which these passages consist; 2. on obstruction to the progress of the bile through them; 3. on accumulation of bile or other matters in them; and, 4. on the escape of bile into the cavity of the peritoneum in consequence of their rupture.

The pain which attends inflammatory affections of the membranes of the biliary passages, does not appear to be of a very intense degree, and hence this affection may exist to a certain extent without complaint on the part of the patient.

It is obvious, that where the structural alteration is such as to obstruct the flow of bile into the duodenum, re-absorption will take place to a greater or less degree, and, as a consequence of this, the symptoms included under the term jaundice will arise. The peculiar characters of jaundice, as depending on this proximate cause, will be afterwards to be considered.

When, in consequence of an accumulation of bile, or other fluid, in the gall-bladder, this cavity becomes considerably enlarged, it extends beneath the margin of the liver, and produces a fluctuating tumour which can be felt

through the integuments. Such a tumour is liable to be mistaken for abscess of the liver. The grounds of diagnosis will be mentioned afterwards.

The symptoms which succeed to the escape of bile into the cavity of the abdomen, terminating, after a brief space of time, in death, are similar to those which arise from other substances escaping into it from other cavities.

Treatment. The only indication of practice which we can expect to fulfil in this class of affections, is to reduce inflammatory action when it is present. The means to be employed for this purpose do not differ from those that are applicable in the parenchymatous inflammation of the liver, to the treatment of which, therefore, we refer.

INFLAMMATION OF THE LIVER.

Hepatic congestion and Hæmorrhage—Symptoms and treatment.—Acute Hepatitis. — Symptoms. — Terminations. — Chronic Hepatitis. — Diagnosis and treatment of Hepatitis.

The parenchymatous substance of the liver, and its investing serous covering, are both susceptible of inflammation, which may commence in, and for a time be limited to, the one or the other of these textures, though, in a large proportion of cases, both become eventually involved. The hepatic inflammation may be either acute or chronic: it has been supposed to partake of the acute character when it is seated in the serous covering; and when it attacks the parenchyma of the gland, to assume the chronic form. This observation may be generally true as regards the disease in temperate climates, but it cannot be applied to it when it occurs in tropical regions, in which acute inflammation of the substance of the liver is by no means infrequent.

Hepatic Congestion and Hæmorrhage. Congestion of the liver seems, in most cases, to depend upon mechanical obstruction to the passage of the blood, through either or both of the venous systems with which the liver is provided, to the right side of the heart; whether the obstruction be situated in the portal or hepatic veins themselves, in the vena cava ascendens, in the heart, or even in the lungs. The effect of obstruction in the vena portarum is communicated to the stomach, pancreas, intestines, &c. as these organs discharge their blood into that vessel.

But congestion of the liver may occur, when no impediment to the flow of the blood can be detected. So occurring, it is sometimes accompanied by increased vascular action, in which case it constitutes what is termed *active* congestion, a state, the relation of which to simple inflammation it is not easy to determine, but which seems readily to pass into it. Sometimes the congestion is unaccompanied with any increase, or is even attended with a diminution of vascular action, as in scurvy, constituting what is denominated *passive* congestion.

In some cases of congestion, the substance of the liver is uniformly red; but in others it is mottled red and yellow or white. Those who maintain the existence of two distinct substances in the liver, attribute this mottled appearance to one of those substances undergoing congestion, while the other remains free from it. But Mr. Kiernan and others, who regard the liver as uniform in its structure, explain its mottled appearance by supposing that the congestion may be confined either to the hepatic or to the portal venous system, and that according as it is seated in one or the other, will be the relative positions of the two colours.

The state of hepatic congestion seems sometimes to appear and disappear very rapidly, particularly (according to Andral) when it depends upon

diseases of the heart. In whatever form it occurs, it may undergo resolution spontaneously, or from medical treatment; but it may lay the foundation of distinct inflammation, and probably, also, of non-inflammatory alterations of structure.

One of the results of excessive hepatic congestion, is an extravasation of blood. It would appear that this fluid, in some cases, passes through the secreting vessels of the liver into the tubuli biliferi, replacing, or mingling with, the bile, and is discharged by the larger gall-ducts into the intestinal canal. In other instances, the extravasation takes place into one or more portions of the substance of the liver, producing parenchymatous hepatic hæmorrhage; or it may occur immediately beneath the peritoneal coat of the liver. In other cases, the blood escapes by the rupture of the liver (or by mere transudation) into the cavity of the peritoneum. Hepatic hæmorrhage, however, may occur without previous congestion, from rupture or ulceration of the larger vessels.

There is a peculiar morbid appearance of the liver occasionally met with in pernicious intermittent fevers, which seems nearly allied to congestion. In these cases, the liver seems to be wholly composed of black blood slightly coagulated, and of cellular filaments which alone offer any resistance to the finger. When this resistance is overcome, the liver is reduced to a gelatinous pulp. An analogous morbid appearance is, as will afterwards be seen, of more common occurrence in the spleen.

Symptoms. In the state of congestion, the liver, being increased in bulk, produces feelings of weight and distention in its seat, and if the congestion be to a considerable degree, it projects beneath the ribs. Jaundice is liable to arise, the characters of which, as depending on this cause, will afterwards be noticed, as well as the appearance of the alvine evacuations.

With respect to the *treatment* of hepatic congestion, we may in general remark, that it is to be conducted on the same principles as that of the more chronic forms of inflammation of the liver.

Acute Hepatitis. The precursory symptoms of acute inflammation of the liver are very similar to those of gastric fever; but as the disease proceeds, the local signs which supervene soon indicate its particular nature. The type of the accompanying fever, in its early stage, is generally inflammatory; but towards the termination of the hepatic inflammation, the febrile symptoms may assume a typhoid character, especially when the disease has been protracted, or the powers of the patient have been enfeebled by previous illness. At the onset of the disease, the skin is hot and dry, the pulse full and often hard, the tongue covered with yellow fur, the patient is thirsty and complains of bitter taste in the mouth, he feels frequently sick, and occasionally vomits a bilious or dark coloured fluid. The bowels are generally constipated, though often relaxed, and the urine is scanty and of a deep orange colour, and deposits, on cooling, a red sediment.

These general symptoms are accompanied with *pain* more or less severe in the region of the liver, either in the epigastrium, or under the cartilages of the ribs towards the spine, and increased on pressure, deep inspiration, cough, or lying on the right side. The pain is more acute when the peritoneal covering of the liver, or the portion of the parenchyma immediately subjacent, is inflamed.

It is well known, that, in hepatic affections, the right shoulder is frequently the seat of sympathetic pain; a fact of which no satisfactory explanation has yet been proposed: nor is it well ascertained what are the affections of the biliary organs in which it occurs. Its frequent occurrence in hepatitis has led to the idea of its being a pathognomonic symptom of this disease. It is, however, far from being uniformly present in this affection, although, when it does occur, in a case resembling hepatitis in other respects, it may be considered as conclusive of the nature of the disease. But though hepatitis may be the affection in which this symptom is most commonly observed, it does not follow that it is exclusively confined to it; most authors concur in stating that it also accompanies the passage of concretions through the gall-ducts.

It may be here remarked, that, besides the right shoulder, sympathetic pains may also occur, in hepatic affections, in other situations, as between the scapulæ, over the right clavicle, or the left shoulder and clavicle. They are sometimes observed in the loins and lower extremities. Andral mentions a case of cancer of the liver, in which no pain had been referred to the hepatic region, but from time to time a very painful sensation was experienced on both sides of the chest, that soon extended to the arms and hand. The same author has observed, that in some cases of affections of the liver, the only pain has been in the head; and this has sometimes been sufficiently intense, constant, and long continued, to fix exclusively the patient's attention.

Considering the intimate relation of the diaphragm to the liver on the one side, and to the lungs upon the other, it is not surprising that the function of respiration is sometimes deranged in the progress of hepatic disease. Of these derangements, the one which has attracted most attention is hepatic *cough*, which occurs not unfrequently in inflammatory affections of the liver, and sometimes in diseases not inflammatory, particularly enlargement. Dr. Pemberton mentions, that he never knew cough to occur as a symptom of acute hepatitis till after forty-eight hours from the first seizure, but that at a later period of the disease it is very common. He remarks, that the cough is dry in membranous inflammation of the convex surface of the liver, irritating the diaphragm; loose when the general inflammatory diathesis increases the bronchial secretion, or when, either by extension from the liver or by community of cause, inflammation of the bronchial membrane accompanies hepatitis. Some suppose that hepatic cough is to be accounted for by the increased weight of the liver, dragging down the diaphragm, and stretching and irritating the respiratory nerves. (See *Trans. of Assoc. of Phys. in Ireland*, vol. iii. p. 245.)

Another local sign of hepatic inflammation, is *tumefaction*. According to M. Piorry (*Proc. Operat.*), in cases of hepatitis, or sanguineous congestion, the liver is susceptible of great increase of volume, its dimensions diminishing rapidly after a copious bleeding, or sometimes by strict regimen. The tumefaction is detected by mediate percussion by means of the plessimeter. In using this instrument, it should be applied over the epigastrium, hypochondrium, and also over the lower portion of the chest, both anteriorly, laterally, and posteriorly, by which means the extent of the hepatic tumefaction can be generally determined with ease. It is necessary, however, to guard against any source of fallacy, such as the intestines being loaded with flatus or alimentary matters.

The occurrence of *jaundice*, as a symptom of hepatitis, is by no means uniform. Dr. Stokes thinks that it much more commonly attends inflammation of the duodenum, than that of the liver; but that it is by no means a regular occurrence, even in the former disease. It is therefore evident, that though yellowness of the skin is occasionally observed, it is not a pathognomonic symptom of hepatic inflammation.

Terminations. The most favourable termination of hepatic inflammation is, of course, that by resolution. When this happens, the fever gradually abates, the pain and tumefaction in the hepatic region diminish, the tongue becomes cleaner, the appetite improves, and the countenance assumes its natural colour and expression.

Inflammation of the parenchyma of the liver, when uncomplicated with other disease, rarely proves fatal until it has existed for a considerable time. Pathologists, therefore, have seldom an opportunity of witnessing the effects of incipient inflammation on the liver, except when hepatitis supervenes on fever or dysentery. In such cases, the usual appearances of inflammation may be observed, either over the whole surface, or throughout the whole internal structure, of the liver, or confined to a single lobe or portion of a lobe. The surface of the liver is generally more vascular than usual; and this appearance also descends more or less into its substance, which exhibits gene-

rally a brownish red colour. The parenchyma is soft and friable, and congested with blood; effusions of lymph or false membrane cover its surface, by which the organ adheres to the adjacent parts. When torn, it has a granular appearance, and its colour is brighter and deeper than usual. (*Annesley*, vol. i. p. 433.)

The effusion of serum into the substance of the liver (commonly designated *œdema* of this organ) has often been observed, but uncombined with marks of acute inflammation. So long as serous effusion is the only product of inflammatory action, absorption may take place, so as to leave no trace of disease. It is consequently most frequently in connection with the other forms of inflammatory effusion, that inflammatory œdema of the liver is met with.

The effusion of coagulable lymph into the substance of the liver, with more or less of serous, but without purulent effusion, seems to occur in chronic cases, or in those which had originally been severe, but which have been partially subdued by active treatment. This effusion is attended with a greater or less degree of induration and enlargement of the whole organ, or of a portion of it, and particularly of the right lobe.

The formation of pus, and consequently of one or more abscesses in the liver, is a frequent result of inflammation, whether acute or chronic. From the observation of fatal cases of hepatitis, there is reason to believe that suppuration of the liver commences with softening of one or more small portions of its substance, and infiltration, at those parts, of sero-purulent fluid. The texture surrounding these softened portions is more vascular than usual. By the gradual absorption, probably, of the softened portions, and increasing purulent secretion, the extent of the abscess is gradually enlarged.

There is considerable variety in the number and size of hepatic abscesses. Sometimes they are about the size of a filbert, and numerous; in other cases, a single abscess occupies nearly the whole of the liver, yielding sometimes as much as ten or eleven pounds of pus. From experiments of Mr. Marshall, it appears probable, that during the formation of pus, the liver increases in volume exclusively of the purulent secretion, no doubt, in consequence of sanguineous congestion and effusion of lymph.

The rapidity with which abscesses form in the liver, varies exceedingly; but there is often great difficulty in determining the exact period when the inflammation commenced, so as to calculate the time which intervenes between the first invasion of the disease, and the supervention of suppuration.

In the progress of an hepatic abscess towards the surface, it sometimes, but not always, forms adhesions with the neighbouring parts; when this does not occur, the contents of the abscess are liable to be discharged, either by its ulceration or its rupture, into the cavity of the abdomen, giving rise to peritoneal inflammation of a fatal character. This termination may, it is obvious, occur in whatever part of the liver the abscess is situated. Even when abscesses, whether originating in the substance of the liver, or forming on its surface, have been accompanied by adhesive inflammation, the false membrane by which they are joined to the neighbouring organs may become ulcerated or ruptured, and the same effects ensue, as if no adhesion had ever existed.

Hepatic abscesses sometimes form adhesions with the abdominal parietes, and point externally; in this case, unless opened artificially, they must burst and discharge their contents. Several cases of this kind are recorded, in which a cure was effected. The abscess may point at any part of the surface of the body with which the liver is in contact.

When an abscess occupies the upper or convex portion of the liver, near the suspensory ligament, and adhesive inflammation occurs on its outer surface, the diaphragm will form a part of the sac, and its substance be gradually removed by progressive absorption. In the mean time, the corresponding pleural surface of the diaphragm may either take on adhesive inflammation, and become attached to the lung, or it may remain free. In the latter case, when the whole thickness of the diaphragm is perforated, the contents of the hepatic abscess will be discharged into the right cavity of the chest, producing all the

effects of empyema; the purulent collection in the thorax may point externally, and either undergo spontaneous rupture, or be opened artificially. But if adhesion take place between the diaphragmatic and the pulmonic pleura, the abscess will open into the parenchyma of the lungs, and be discharged, more or less completely, by expectoration. The size of the aperture in the diaphragm, by which an hepatic abscess is discharged into the cavity of the chest, or into the substance of the lung, is sometimes very small. In a case mentioned by Curtis, it was not larger than a quill. "The matter," says Dr. Pemberton, "either bursts suddenly into the lungs, by which the patient is instantly destroyed; or it filters through immeasurably small orifices into the air-cells, and is spit up gradually for many weeks. This fortunate occurrence may still give the patient some chance of recovery; but it more commonly happens, that after having been worn down by continual coughing and hectic fever, he at last sinks under the disease." Mr. Curtis and Mr. Marshall are of opinion that recoveries under such circumstances are extremely rare.

A few instances have been observed, in which an abscess of the liver has discharged itself into the cavity of the pericardium. (Andral, *Anat. Pathol.*)

In some cases, hepatic abscess is discharged into some part of the alimentary canal, as into the stomach, duodenum, or transverse arch of the colon. When the matter bursts into the stomach, it may be discharged partly by vomiting and partly by stool; when it bursts into the colon, the matter escapes entirely by stool. When this mode of discharge takes place, the patient not unfrequently recovers. It has been alleged that the contents of hepatic abscesses occasionally find their way into the intestinal canal, through the gall-ducts, which they enter by a preternatural aperture. Few instances of this kind have, however, been ascertained by actual dissection. In a case of hydatid abscess, which occurred to Valsalva, an opening was formed into the biliary ducts, by a large orifice. The duct was dilated throughout the whole of the rest of its extent, showing manifestly, as Morgagni remarks, "how it might have received vesicles from the abscess, and conveyed them into the duodenum."

Occasionally, one and the same abscess opens by several apertures, either in the same or in different directions, and at several times. In a case mentioned by Bajon, an hepatic abscess opened first into the lungs, and afterwards into the intestinal canal; and Dr. Graves has recorded a case, in which an hepatic abscess, besides opening into the stomach by three perforations, also opened into the sac of the pericardium. (*Dub. Med. Journ.*, No. xiv. p. 349.)

Sometimes, two or more abscesses may reach the surface of the liver, either taking the same or different general directions. Petit mentions a case in which an hepatic abscess was opened, and five months afterwards, when it was healed, the patient had an attack of illness accompanied with purulent alvine evacuations. He died on the fifteenth day of this attack, when there was found an abscess on the concave part of the liver, opening into the colon. In a case related by Drs. Graves and Stokes, the contents of an abscess in the right lobe of the liver escaped into the intestines, but subsequently an abscess in the left lobe burst into the sac of the peritoneum.

More rarely, hepatic abscesses have been found to take other routes than those hitherto mentioned, as, for instance, to open into the vena cava, or into the infundibulum or pelvis of the kidney.

When hepatic abscesses are discharged by nature or art, it frequently happens, particularly when the aperture is external, that the discharge gradually diminishes, and ultimately ceases; and consequently it may be inferred that the cavity is obliterated by cicatrisation. Various cases have been recorded, in which fibrous and cartilaginous portions of substance, with radii stretching to a greater or less extent from a common centre, have been met with in the liver, in examinations after death, where there had been reason to suspect the existence of hepatic abscess during life. But to the recognition of these appearances as genuine cicatrices it has been objected, that they have never been met

with in the successive stages which a cicatrising abscess must pass through, previously to the completion of that process.

Besides the progressive absorption attendant on the progress of hepatic abscess, the liver has appeared to be in some cases the seat of ulceration. This process may accompany, or supervene in the progress of, abscess, either attacking its inner surface, when it has discharged its contents into the lungs, or destroying the circumference of an abscess that has contracted adhesions with a neighbouring organ.

Does the liver ever become the seat of gangrenous inflammation? There can be no doubt that many cases of softening or dark discolouration of the liver have been erroneously cited as examples of this occurrence. Mr. Annesley says he has never seen a true case of this affection. Dr. Chisholm refers to two cases, in which he supposed gangrene to be induced by inflammation of the liver. In one the fœtor, on opening the abdomen, was intolerable: three fourths of the liver was destroyed by abscess, and the remaining fourth resembled rotten wood, and crumbled when it was handled. In the other case, the patient died on the fourth day of acute hepatitis. The concave surface of the liver was completely sphacelated, and on the convex was an abscess with adhesion. Mr. Marshall, also, in two cases of dysentery, found abscesses in the liver, containing ill-conditioned offensive pus, with their walls in a state of gangrene. Dr. Stokes has been led, by the consideration of what he conceives to be a case of actual gangrene of the liver, to suspect that it is never the result of inflammation, but that it may be induced by hepatic apoplexy.

We have seen that inflammation sometimes increases the bulk of the liver, by the effusion of coagulable lymph. But in cases of a very chronic character, a diminution of its bulk sometimes takes place; and in some instances of this kind, superficial cicatrices have been observed on the liver, suggesting the opinion that its diminished bulk had proceeded from the previous existence of abscess. But this, it is obvious, would occasion only a partial, not a general, shrinking; and in other cases of diminished bulk of the liver, no appearance of cicatrix can be detected. From the observations of Dr. Saunders it would appear, that though, in cases of this kind, there is an increased density and diminished porousness of the parenchymatous substance of the liver, there is, on the whole, a diminution of the weight of the organ, leading to the inference that it has undergone not a mere compression, but a removal of a portion of its substance.

Chronic Hepatitis. The symptoms of chronic inflammation of the liver are often extremely obscure. In some cases there is nothing to indicate its presence, except a slight derangement of the digestive functions. There is sometimes a sensation of weight, with tenderness on pressure, in the region of the liver. In other cases, digestion is accompanied by pain, oppressive fulness of the epigastrium, and frequent vomiting. The countenance assumes a yellow hue, the bowels are inactive, the patient becomes emaciated and subject to fits of great dejection of mind. Frequent accessions of slight fever, especially in the morning and evening, are not unusual.

The appearances after death, in cases of chronic hepatitis, are far from being of a uniform character. In most cases, the liver is slightly enlarged. Sometimes its density is increased, at others it is softer than natural. It is important to bear in mind, that acute hepatitis sometimes supervenes upon the chronic affection.

Diagnosis. Hepatitis may be distinguished from gastro-enteritis by the character of the accompanying fever, which in the former affection is usually of an acute form, while in the latter it is generally of a low typhoid nature. The seat of pain, and the tumefaction over the right hypochondrium, may also assist in distinguishing these affections.

The most difficult diagnosis connected with this disease, is to distinguish it from chronic pleurisy attended with effusion. On this subject Dr. Stokes observes,—" From our experience, we should say that the indication which is the

most unequivocal, is drawn from the state of the intercostal spaces. When the side is dilated by a fluid, as in empyema, the spaces are raised to a level with the ribs, or even protruded beyond them, and the side has generally a smooth and rounded appearance. On the other hand, when the dilatation is produced by a solid tumour, such as an enlarged liver, the reverse of this occurs, the pressure being exercised on the ribs, these are pushed outwards, but the intercostal spaces preserve their relative positions with them, and the side does not present any thing of the smooth and rounded appearance which we have described. There are cases, however, where even this diagnosis is not applicable, such as when the patient is fat, the integuments œdematous, or the belly distended by fluid. Under such circumstances the difficulty of diagnosis is extreme." (*Cyc. Pract. Med., loc. cit.*)

Treatment. It seems now to be generally allowed, that whatever assistance the medical practitioner may seek, in the treatment of the inflammatory affections of the liver, from the administration of specific remedies, these must be used as auxiliaries to, and not as substitutes for, antiphlogistic measures.

As respects the practice of *general bloodletting* in the inflammatory affections of the liver, it must be conducted on the same general principles as in inflammations of other organs. In obscure cases we may be guided as to the extent of the bleeding, by the appearance of the blood. Generally speaking it may be said, that the difficulty of overcoming acute inflammation of the liver, and of preventing it from assuming a chronic character, is a strong reason for the early and vigorous employment of bloodletting. The quantity to be drawn must of course be influenced by the conditions of the patient; and in warm climates, those recently arrived admit of, and require, a more copious detraction of blood than those who have resided in such a climate for some time.

When, from the previous employment of general bleeding, from the constitution of the patient, from the slightness of the attack, or from the stage of the disease, general bleeding seems inexpedient, notwithstanding the continuance of some degree of phlogistic diathesis, great advantage may be derived from *local bleeding*. Some recommend the blood to be drawn from the anus or sacrum, rather than from the region of the liver itself. There can be no doubt that leeches are preferable to cupping, as the pressure of the cupping glasses, besides being productive of much pain, has a tendency to aggravate the disease. This will be a motive with the practitioner to apply the cupping glasses, if they are to be used, to the sacrum, rather than to the hepatic region. The application of hot poultices to bleeding leech-bites, in cases of this kind, is often very advantageous. The propriety of repeating the local, like the general bleedings, must be determined by the particular circumstances of the case.

Notwithstanding the apprehensions of Broussais and his followers as to the effects of *purgatives*, British practitioners hold it as established, that, as antiphlogistic remedies, this class of medicines are next in efficacy to bloodletting; and that, both on account of their beneficial influence on the intestinal canal, and of their utility in lessening the force of the circulation, they should not be omitted in inflammatory affections of the liver. (*Ballingall, Marshall.*) As to the selection of the particular purgative (setting aside at present the claims of calomel), the neutral salts seem to be those most likely to answer the indication. Dr. Saunders thinks that their antiphlogistic effect is enhanced by exhibiting them in a diluted form. Even when calomel is administered at night, it should be followed up in the morning by some other purgative, as some of the neutral salts, the infusion of senna, or castor oil. When these are tardy in their operation, there ought to be no delay in assisting them by the employment of injections.

Mr. Annesley disapproves of the employment of *emetics* in this affection, affirming, that where any inflammation of the liver exists, or even a tendency to it, the acute character of the disease is greatly increased by their administration, although for a short time they may appear to give relief. It is only, therefore, as a test of the existence of inflammatory affection, and of the

expedieny of adopting a decidedly antiphlogistic treatment, that, in Mr. Annesley's opinion, emetics are to be used in suspected cases of hepatic inflammation.

The use of counter-irritants, and particularly of blisters, in the more advanced stages of acute hepatitis, and in its more chronic form, is frequently productive of the most beneficial results. Dr. Saunders says, "Blisters applied to the region of the liver, co-operate very strongly with the views of bloodletting, and therefore, in attempting resolution, recourse should be had to them very early." But Mr. Annesley very properly cautions us against resorting to blisters, until the acute inflammatory symptoms have been previously subdued, otherwise they often tend to prolong the disease ; and even in the more chronic forms, he thinks, their use should be preceded by other measures. Dr. Saunders, Sir G. Ballingall, and others, recommend a quick succession of blisters, in preference to keeping them open by means of stimulating ointments; and this is particularly to be attended to in hot climates. As another means of counter-irritation, applicable to the more chronic forms of hepatitis, some practitioners recommend the introduction of a *seton*, or the establishment of an issue.

As a very important part of the antiphlogistic treatment, the necessity of a rigid adherence to a conformable system of *diet* cannot be too strongly insisted upon; a measure which, for obvious reasons, is more directly, if not more forcibly, indicated in the inflammatory affections of the liver, than in those of almost any other organ.

There is, perhaps, no class of inflammatory affections where it is more necessary for the practitioner to guard against having his apprehensions lulled by any apparent or temporary improvement, than in those of the liver. The decline of the more urgent symptoms of acute hepatitis, is no proof of the removal of the internal disease. During this apparent remission, abscesses may form in the liver, and a more uncontrollable disease be established.

With regard to the employment of *mercury* in those affections of the biliary organs which depend on derangements of the circulation, viz. the congestive and the inflammatory, it may be remarked that the beneficial operation of mercury in these cases has been explained on very different principles. By some it has been conceived to depend on its operating primarily on the liver, or on the intestinal canal, as others imagine, and through these upon the circulatory system; whilst others suppose that it operates directly upon the circulatory system itself, or at least on that portion of the nervous system on which the action of the circulatory system immediately depends. Dr. Currie attributed the beneficial effects of mercury to its specific power of emulging the biliary ducts. Rejecting this explanation, Mr. Twining conceives that the efficacy of mercury in hepatitis may be accounted for on the same principle on which its use in the remote stages of other inflammations depends. These contradictions, of themselves, serve to show the correctness of Dr. Saunders's statement, that "it is a matter of dispute among those who recommend calomel as a specific in liver complaints, whether it acts by purging, or by exercising any local operation on the biliary ducts, or by acting on the general system, and ultimately by salivation; it being a very prevailing opinion among them," he adds, "that when the system is impregnated with mercury, suppuration of the liver seldom takes place." Mr. Annesley, however, particularly insists on the difficulty or impossibility of inducing salivation, so long as the inflammatory action is unsubdued, and conceives that the use of mercury, so long as this is the case, favours the formation of abscess. In these views Mr. Twining fully concurs, "The utility of mercury in hepatitis," says the latter, "is readily admitted, but it is subordinate to venesection."

That the number of practitioners in India, who rely solely upon the mercurial treatment of hepatitis, without the employment of venesection, has in recent times been greatly diminished, we have much satisfaction in believing; but that they are wholly extinct, must not, we fear, be supposed. Sir G. Ballingall, in 1818, and Mr. Annesley, ten years later, speak of the prevalency of this mode of practice with unqualified reprobation. And here it is natural

to inquire, whether medical men, in their deliberations as to the expediency of prescribing mercury for inflammatory affections of the liver, ought to be influenced by the climate in which they may chance to practise. Does the hepatitis of India, in particular, require this remedy more than that of Britain? It has frequently been maintained, that the hepatitis of India is an essentially different disease from that of temperate climates; and that the therapeutical maxims applicable to the one, cannot be relied on in respect to the other. Considering the recent progress which has been made in approximating the treatment of other inflammatory affections in India, to that which is followed in this country, we suspect that time and experience will show that there is no fundamental difference in the practice required for the inflammatory affections of the liver in these two regions.

Is mercury to be used when hepatic inflammation has passed into the state of suppuration? We have already noticed the opinion, that when the system is brought under the influence of mercury, as indicated by salivation, suppuration will not occur. The converse of this proposition has been asserted by some authors, as by Mr. Marshall, who says that when the liver contains an abscess, he suspects no quantity of mercury will cause ptyalism. Mr. Annesley makes a similar statement, and grounds upon it his recommendation to desist from the use of mercury when hepatic abscess is suspected. Drs. Graves and Stokes, and Mr. Malcolmson also, bear witness to the same fact, of the impossibility of producing salivation during the continuance of suppuration.

Upon the whole, it would appear, that, according to the best authorities of the present day, the proper period in inflammatory affections of the liver, for commencing the use of mercury, is after the violence of the attack has been in a great measure subdued by the ordinary antiphlogistic remedies. Exhibited at this period of the disease, it has been supposed, by some of the most experienced authors, to remove accumulations of acrid bile, to diminish sanguineous congestion, and to obviate the tendency to chronic inflammation, which frequently remains after the acute symptoms have subsided. (*Saunders, Marshall, Annesley.*) Whether these purposes might not be equally effectually accomplished by other means, is a question that could only be ascertained by very cautious trial in a considerable number of cases, and on which we do not feel ourselves entitled to offer a judgment.

But if medical practitioners differ as to the indications which mercury is intended to fulfil in the treatment of hepatitis, scarcely less do they differ as to the mode of its administration; as to whether the system ought to be brought under its influence, according to the technical phrase, by small doses, repeated at short intervals for a considerable length of time, or by larger doses, administered at more distant intervals. Mr. Curtis generally employed gr iij of calomel, with gr iv of soap and rhubarb every night and morning (6 gr of calomel per day); and if it was thought necessary to have the mouth soon affected, he caused a drachm of mercurial ointment also to be rubbed in along the side every night. "After the mouth became sore, the mercury was repeated in small doses, for two or three weeks, or until every symptom of the disease had disappeared." To this mode of practice, which has been very generally followed by other Indian practitioners, Mr. Annesley is decidedly hostile. To him it appears, that to induce the mercurial excitement of the vascular system, indicated by slight soreness of the gums, and to exhibit mercury or calomel in small quantities frequently repeated with this view, is to keep up a slow inflammatory action in the secreting substance of the liver, which may terminate in abscess; whilst if the full operation of mercurial remedies be speedily induced, and ptyalism becomes abundant, a derivation from the seat of disease is occasioned to the mouth and salivary glands, the disease of the liver speedily subsides, and the functions of the organ are restored to their healthy state. When the use of calomel is clearly indicated, therefore, it is most beneficial, according to Mr. Annesley's experience, in large doses, with the intervention of generally not less than twenty-four hours between the administration of each dose. He recommends gr xx of calomel

to be given at bedtime, and a purgative in the morning, by which plan he says a much smaller quantity of mercury is required for salivation than when smaller doses, frequently repeated, are prescribed. The smaller doses, he adds, are also apt to induce irritability of the bowels, which the larger dose has a tendency to subdue. Dr. Chapman, on the contrary, thinks that small doses are most beneficial. "When calomel is too largely exhibited as an evacuant," he says, "our purposes are frustrated by the ultimate overwhelming of susceptibility, leaving the alimentary canal and liver in the torpor of direct debility, or inducing a pernicious state of irritation, or positive phlogosis, with an irregular febrile movement." Dr. Malcolmson also regards the practice of administering large doses of calomel in hepatitis as extremely pernicious.

When we come to inquire into the objects contemplated by practitioners in the administration of mercury in the more chronic and structural diseases of the liver, it is no longer the mere regulation of the secretion or excretion of the bile, nor the diminution of the force of the circulation, that are assigned as the motives for its employment; but it is to promote the absorption of morbid depositions. Of the power of mercury in stimulating the absorbent system, many familiar illustrations might be quoted, as the disappearance of dropsical effusions under its administration alone, or in combination with diuretic medicines; the removal of the lymph effused in iritis; the diminution of indolent enlargements of absorbent and secretory glands: but these are salutary changes which nature frequently accomplishes for herself, or with but little assistance; and it may be fairly questioned, whether any of the structural alterations of the liver, not of an inflammatory character, which do not undergo spontaneous resolution, ever disappear under, or in consequence of, the administration of mercury. At all events, the prejudicial operation of mercury in the chronic structural affections of the liver, is recognised by a number of high authorities. Mr. Thomas Clark mentions, that he had frequently known very bad effects produced in liver diseases, from the too violent operation of mercury. "Nay, it has often appeared to me," says he, "that even when it has removed the disease in the first instance, it has laid the foundation for a relapse which proved fatal. The excessive debility occasioned by a violent mercurial course, readily accounts to me for such consequences." Dr. Dick, whose experience in liver complaints, both in India and in England, was very extensive, also notices the great liability of these complaints to return, when treated with mercury. Nor is the view taken by Drs. Pemberton and Saunders of the effects of mercury in this class of cases, more favourable.

To those who participate in the opinion we have ventured to express of the injurious effects of mercury on the economy, even when very cautiously administered, and who at the same time are impressed with the belief that the affections of the biliary organs require *specific* remedies for their treatment, it cannot but be gratifying to find in how high estimation the nitro-muriatic acid, as it has been called, exhibited both internally and externally, is held by Indian practitioners in the treatment of these diseases; and how closely the physiological effects of this remedy are conceived to correspond with those of mercury. This medicine was first used as a substitute for, or as an adjuvant to, mercury, by Dr. Helenus Scott, who printed a paper on the subject in 1796. He at first administered the remedy internally, but although satisfied with its general effects, he found that this mode of using it was attended with considerable inconvenience. He found, however, that a bath of this acid sufficiently diluted with water, produced equally agreeable results, and he subsequently ascertained that merely sponging the skin with a wash of this kind was not less efficacious. (*Med. Chir. Trans.*, vol. viii.) Dr. Scott is convinced that the very same effects arise from a diluted solution of chlorine in water, as from nitro-muriatic acid; an opinion since adopted and supported by Mr. Wallace of Dublin. Sir James M'Grigor tried the nitro-muriatic acid, in India, in about 200 cases of dysentery and hepatitis, and with very general success. "One fact," says Sir James, "we are clear and decided in, — that the injury to the

constitution is infinitely less from the acid, than from the mercurial ointment; and that men are not half the time convalescent from the first, that they are from the last remedy." In the medical sketches of the expedition from Egypt to India, published in 1804, Sir James again alludes to the use of nitric acid, as a practice, from which, on a large scale, for the preceding six years, he had observed the best effects, and which he considered likely to become general in India. These anticipations seem to have been in a great degree realised. Mr. Annesley says, "There are very few remedies which are more deserving of notice than the nitro-muriatic acid wash, and the internal use of nitric acid, in cases of acute hepatitis, after active depletions and mercury have been used. They promote the return of strength, and the healthy establishment of the biliary secretions, and if deobstruent laxatives, with suitable regimen, be prescribed, and adhered to during their use, they remove obstructions, and promote a free circulation in the vessels of the liver. As a restorative of the energies of the system, after mercurial courses, they have generally proved beneficial in our practice, particularly when conjoined with the cautious exhibition of gentle tonics, with light but nutritious diet, and suitable regimen."

Taraxacum has enjoyed considerable reputation in the treatment of chronic diseases of the liver. Of this remedy it may be said, that if it has not been the cause of all the good which has been ascribed to it, its employment is not attended with the same risks as that of some more active substances. Boerhäave entertained a very favourable opinion of its efficacy in the removal of biliary calculi. Dr. Pemberton states, that he has seen the most decided advantage from its use in the treatment of chronic hepatitis, as well as of incipient scirrhus (induration) of the liver, and in chronic derangements of the stomach. He recommends a pint of the infusion to be taken daily in divided portions, the infusion being made by adding a quart of boiling water to ten fresh plants, root and leaf, and straining off the liquor as soon as it is cold.

We have now to offer a few observations on the measures proper to be pursued when hepatic abscesses find their way to the surface of the body.

Different practitioners have given very different estimates of the success which has attended the artificial opening of hepatic abscesses. In the practice of some, it appears to have been eminently successful; while in that of others, the results have been invariably fatal. The circumstances which appear most favourable to the success of this operation are the following:—1. The abscess being confined to the investing membrane of the liver, without involving its parenchymatous structure. 2. The abscess being single and of small size, whether it be confined to the membrane or seated in the substance of the liver. 3. The existence of adhesions between the abscess and the abdominal parietes, by which the discharged matter is prevented from escaping into the cavity of the abdomen. 4. Redness and prominence externally, over the seat of the abscess, both because these circumstances are supposed to imply that adhesion has taken place, and also because they indicate a condition of parts in other respects favourable. 5. The patient being young, and of sufficient strength to bear the shock of the operation. On the contrary, when the abscess is deep-seated, when it is of a great extent, or when it is not surrounded by adhesions, and when the patient is advanced in life or greatly emaciated, an unfavourable termination may be looked for.

Two modes of opening hepatic abscesses have been recommended, as calculated to increase the chance of adhesions taking place previously to the discharge of their contents. One of these is the application of caustic potash; the other, suggested by Dr. Graves, is that of making an incision of some length through the integuments, over the most tumid parts of the hypochondrium, dividing some layers of muscle, and keeping the wound open by plugging it with lint. Most authors, however, agree in stating that neither of these methods can be depended upon; and, in many cases where they have been had recourse to, it has been found, in post mortem examinations, that the desired adhesion had not been formed. It is objected to the mode of opening hepatic abscesses by

caustic, that it is so tedious a process, that before the object is effected, the abscess may have enlarged to a fatal amount. It has been found, however, that abscesses of the liver, like those of more superficial origin, may be absorbed under the application of caustic. Dr. Dick told Mr. Abernethy and Sir C. Bell, that in his practice in India, having under his care a case of abscess of the liver pointing outwards, he wished to open it gradually, and for this purpose had applied caustic; but instead of finding that he attained, in any degree, his object of opening the abscess, he soon discovered that it was lessening, and that its walls had become much thickened. In short, the matter was absorbed, and the patient restored to health. Other cases of similar success followed, and he was thus led to consider severe counter-irritation as a most advantageous means of producing the absorption of matter. (*Treat. on Dis. of the Liver*, by G. H. Bell.)

When we are not deterred, by any doubts respecting the existence of adhesions, from giving immediate vent to the contents of an abscess, ought we to prefer, for effecting this purpose, the abscess lancet or the trochar? To the use of the latter instrument, Mr. Annesley objects, that the pus which is formed in abscess of the liver is often full of large flakes, and sometimes contains coagulated clots of a cheese or curd-like matter, which will not pass through the largest trochar, the more fluid portions only coming away. These clots remaining may act as foreign substances, in promoting suppuration of the organ, and febrile excitement of the system. The following is the method of opening hepatic abscesses, which he has been in the habit of pursuing:—"Having made the external incision large, and with caution, until the peritoneum is fully exposed, the fluctuation of the abscess will be distinctly felt. An abscess lancet should then be introduced, and the tumour laid open to the full extent of the external wound, which ought to be from two and a half to three inches in length. Care should always be taken that the opening do not extend beyond the limits of the adhesions which have been formed. The purulent collection being fully evacuated, the cavity should be filled with lint, which gives a mechanical support to the excavated parts, and the wound dressed with compresses and bandages in the usual way."

STRUCTURAL DISEASES OF THE LIVER.

Serous cysts and hydatids.—Adipose degeneration.—Tubercles.—Malignant formations.

1. *Serous Cysts and Hydatids.* Under the term hydatid, pathologists have frequently included two morbid changes of structure, which are, in reality, very distinct; 1. a collection of watery fluid contained in a cyst, the inner surface of which exhibits the general character of serous membranes, the outer surface being either adherent to the substance of some organ in which it is more or less imbedded, or covered with a layer of condensed cellular substance of greater or less thickness; 2. a cyst of the same general characters as the preceding, but containing within itself one or more detached cysts, which are supposed, from various circumstances, to be distinct animals, or what are now generally designated *entozoa*. As it is desirable carefully to discriminate between these two kinds of morbid alterations, the former may be denominated serous or watery cysts, and the latter, hydatid cysts; or, from the genus of hydatid entozoa, which cysts of the latter description are found to contain, they may be called *acephalocyst* cysts. Both these forms of cysts are met with in the liver.

The watery or serous cysts may be found on the edge or surface of that organ, or more or less completely imbedded in its substance. How they take their origin, whether by the expansion of a cell naturally existing, or by an entirely new production, is not understood. But, having once commenced,

they may attain very considerable dimensions. They are sometimes single, but sometimes several co-exist.

When a cyst of this kind is not wholly imbedded in the parenchyma of the liver, the distention of its parietes may, in the progress of its development, be such as to occasion its rupture, and the consequent discharge of its contents into the cavity of the abdomen. There seems reason to believe, that in particular circumstances, serous cysts connected with the liver take on inflammation of their inner surface, which may terminate in suppuration, so as to convert their cavity into an abscess.

There is no organ so subject as the liver to the development, in its substance, of acephalocyst cysts; their number may range from one to four, the latter being the greatest number that Cruveilhier has ever met with. The number of hydatids, contained within each such cyst is very various. Cruveilhier states, that the multiple, or fruitful, acephalocyst occurs much more frequently in the liver, than the solitary or barren one. It sometimes happens, that the inner surface of an hydatid cyst suppurates, and its cavity, instead of its usual contents, becomes filled with a mixture of pus and dead hydatids.

In the gradual enlargement of an hydatid cyst of the liver, suppurated or not suppurated, its contents are liable to the same contingencies as those of an abscess of that organ. It may be ruptured either from external violence or spontaneous development, and its contents discharged into the cavity of the peritoneum; or, the cyst forming adhesions with the abdominal parietes, its contents may escape externally; or, in the event of its adhering to the diaphragm, they may enter into the cavity of the chest, or into the lungs; or, if the adhesion shall be to some portion of the alimentary canal, the contents may be vomited or voided by stool.

In the liver of sheep, and of many other animals, there is very frequently found a species of entozoon, popularly known under the name of the liver-fluke, the *distoma hepaticum* of naturalists. This, and another species of the same genus, have, it is alleged, in some few instances, been discovered in the human subject; but this occurrence must be regarded as exceedingly rare.

It occasionally happens, that one or more intestinal worms are met with in the biliary ducts, or perforating the substance of the liver, but they are generally supposed to have passed into these situations subsequently to the death of the patient. Some pathologists, however, have concluded that the migration must occasionally be effected during life, because, in some cases, no other morbid appearance can be detected sufficient to account for the fatal issue, or for the symptoms by which it was preceded. Two obstacles to the entrance of intestinal worms into the biliary ducts, during the life of the patient, have been suggested: 1. the bile, as being an element in which it is conceived intestinal worms could not live; and, 2. the irritability of the ducts, and of their intestinal orifice.

2. *Adipose Degeneration.* A very remarkable, but not very uncommon, structural alteration of the liver, consists in the deposition of fatty matter throughout its substance. A liver that has undergone fatty degeneration, as Dr. Addison remarks, exhibits a pretty uniform and highly characteristic appearance. It is of a cream or pale yellow colour, figured irregularly with brownish or deep orange spots. It is usually, though not always, more or less enlarged, and sometimes very considerably so. Internally, it has somewhat a corresponding appearance, excepting that the brown and pale yellow tissues are much more uniformly distributed internally, than upon the surface. It is sometimes softer, and more readily crushed between the fingers, than is the healthy liver; sometimes, however, it is firmer than natural, and occasionally of a scirrhous, or almost horny hardness.

The presence of fatty matter in the liver is manifested by the unctuous feel which it communicates to the fingers; by the greasiness of the knife with which it has been divided; by the stain which it imparts to bibulous paper; by the exudation of oil, when a portion of its substance is exposed to dry heat, as in

the flame of a candle, or is immersed, in thin slices, in boiling water. It is uncertain whether the oily or fatty matter is, in all cases, of exactly the same nature. In a case, in which the fatty matter amounted to one twentieth part of the substance of the organ, Mr. Bird found it to consist of a soft brownish fat, very fusible, and possessing a peculiar unpleasant odour; and in another case, in which it constituted the greater part of the substance of the organ, Dr. Bostock found it to be generally similar to tallow in its chemical properties. There seems reason to believe, that in proportion as fatty matter is deposited, the proper substance of the liver is removed. We do not know to what extent this substitution may go on, but, from the analysis of Dr. Bostock, it would appear that the greatest part of the organ may be replaced by fatty matter.

3. *Tubercles.* One of the most common structural alterations of the liver, in temperate climates, is that described by Dr. Baillie under the name of the common tubercle of the liver, and which is at present generally recognised under the designation of the granular state of the liver. "The tubercles which are formed in this disease" (says Dr. Baillie) "occupy generally the whole mass of the liver, are placed very near each other, and are of a rounded shape. They give an appearance, every where, of irregularity to its surface. When cut into, they are found to consist of a brownish or yellowish white solid matter. They are sometimes of a very small size, not larger than the heads of large pins, but most frequently they are as large as small hazel nuts, and many of them are sometimes larger. When the liver is thus tuberculated, it feels much harder to the touch than natural, and not uncommonly its lower edge is bent a little forward. Its size, however, is not larger than in the healthy state, and I think it is often smaller. If a section of the liver be made in this state, its vessels seem to have a smaller diameter than naturally. It very frequently happens that, in this state, the liver is of a yellow colour, in consequence of bile being accumulated in its substance. This," Dr. Baillie adds, "is the common appearance of what is generally called a scirrhous liver, but it bears only a remote resemblance to scirrhus in other parts of the body. I should therefore be disposed to consider it as a peculiar disease affecting that viscus."

Various opinions have been entertained as to the nature of this structural alteration. By some, it has been regarded as depending on an entirely new formation; whilst others suppose it to be produced by an irregular development, and more particularly by an excessive growth, or hypertrophy, of the natural substance of the liver, or of a portion of it.

Laennec agrees with Dr. Baillie in regarding these granulations as a peculiar disease affecting the liver, and in reference to the yellow colour, he proposes to apply to this morbid texture the name of cirrhosis. "In proportion," he says, "as the cirrhoses develop themselves, the texture of the liver is absorbed, and often disappears entirely; and in all cases, a liver which contains cirrhoses loses in size in place of increasing proportionally."

M. Bouillaud seems to have been the first writer who maintained that these granular bodies are not referrible to a texture of new formation, but depend on a dissociation or disgregation, according to his own phrases, of the two natural elements of the liver, viz. the acini, or yellow element, and the vascular network, or brown element. Its first stage he conceived to consist in an increase of the extent of the vascular network, caused by habitual sanguineous congestion; and its most advanced, to consist in the obliteration of this network. Andral has adopted the same views with Bouillaud, stating that these granulations are merely a result of hypertrophy of the white substance of the liver; and that there is no need of admitting, with a view to their explanation, the production of any new texture. The red substance may at the same time remain of its natural amount, or it may increase or diminish in bulk; and on this circumstance depend, according to Andral, the variations, in bulk and other physical qualities, of the liver in the state of granulation.

Cruveilhier attributes cirrhosis to atrophy of the greatest number of the

granulations, with a considerable development of those that remain, but without any disorganising process; and lastly, Dr. Hope concludes, from his examinations, that granulations consist not in mere hypertrophy of the white (or yellow) substance, but in an interstitial deposition in that substance, connected with a lesion of secretion.

4. *Malignant Formations.* In a large proportion of the cases, in which any of the forms of new growth to which pathologists apply the term malignant (comprehending the various modifications of scirrhous, cancerous, encephaloid, hæmatoid, and melanose tumours), is met with in the liver, post mortem examinations show that it exists likewise in other organs or textures. And it is probable that, in a great number of cases, its development in the liver is posterior to its appearance in the other parts. It occasionally happens, however, that the liver is the first and only organ in which these malignant formations occur.

Whether cancer of the liver occur as a primary or as a secondary disease, it may be limited to a single point, and spreading from this, attack the contiguous parts in succession; or it may be developed in a number of different points of the organ at the same time. Consecutive cancer limited to a single point may arise from contiguity of texture. Thus, as Cruveilhier remarks, it is not uncommon for cancer of the small curvature of the stomach to attack the lower surface of the liver, — which, having become intimately united to that curvature, replaces the parts of the stomach that have been destroyed, — in such a way that the liver may be removed, by successive layers, from its concave to its convex surface. But, most commonly, cancer of the liver, whether primary or consecutive, develops itself in a great number of points, leaving the intermediate parts untouched. This constitutes what has been called by Cruveilhier cancer of the liver in disseminated masses; and it is to this form of cancerous disease that the remarks we have now to offer principally apply.

When cancer of the liver occurs in disseminated masses, a large proportion of these masses (Cruveilhier says sixteen out of twenty) are observable on the surface of the organ, from which they project in a greater or less degree, so as to produce a corresponding number of prominences of different sizes, which represent portions of a spheroid. As these tumours enlarge, each spheroidal prominence becomes hollowed out towards the middle, by a cup-formed depression. These physical characters of cancerous tumours of the liver are of practical importance, because they can frequently be recognised through the parietes of the abdomen, so as to lead to a knowledge of the nature of the disease. The cupping in the centre which they undergo, Cruveilhier attributes to an increase in the density of the sub-peritoneal cellular tissue at the corresponding point. We have sometimes noticed, in dividing a liver affected in this manner, that in one direction the section exhibited a number of distinct tumours; whilst, when made in another direction, it presented the appearance of an uniform and continuous morbid growth.

The number of points in which cancerous matter is deposited, is very different, varying from one or two, to several thousands; and there is an equal diversity as to the size of the masses; but in general it may be said that their size is in the inverse proportion of their numbers. From the size of a millet seed, to that of the head of a child at birth, they may be found in every successive stage of enlargement, not only in different cases, but in the same identical organ.

In some cases, malignant tumours developed in the liver, exhibit to the eye of the anatomist very characteristic appearances, so that their precise nature can be immediately determined. Thus, melanotic tumours have been frequently found in the liver, among various other organs infested by them. In other cases, the diseased substance has so much the appearance of brain, as to establish its identity with the tumours termed encephaloid. In others, it assumes the hæmatoid character; in which event, fungi may protrude from it, either externally, or into cavities formed in its substance; in other cases, the morbid

structure exhibits the usual characters of scirrhus. It must be acknowledged, however, that no inconsiderable number of malignant growths occurs in the liver, which we do not find it easy to refer to any recognised form of structural alteration.

M. Cruveilhier recognises a hard and a soft variety of the disseminated cancerous masses of the liver, differing from one another, as he conceives, 1. in the web, which is cellular and loose in the soft, but dense and fibrous in the hard variety; 2. in their degree of vascularity; 3. in the greater or less quantity of cancerous juice with which they are penetrated; and, 4. in their progress and development, which is in general slow in the hard tumours, and rapid in the soft ones. It is, however, probable that the hard variety sometimes changes into the soft: at least, they are frequently met with in the same liver, and they may both undergo a disorganising process, which has for its result the secretion of pus, the production of a tubercular or gelatiniform matter, and the conversion of the mass into a pulp (*bouillie*) or gangrene.

The relation between the morbid masses (in disseminated cancerof the liver) and the natural substance of the organ, is very different in different cases. MM. Bayle and Cayol allege, that in cases of this description the liver is always enlarged; its size and weight being sometimes doubled or trebled by the effect of the disease. In this case, they add, it usually fills the epigastric region, and extends into the left hypochondrium. Its inferior border descends to near the right iliac crest, and its convex surface pushes the diaphragm back on the chest, as high as the fifth or even the fourth rib. M. Cruveilhier has, however, observed, that in some of these cases the liver is atrophied either partially or generally. In some instances he has found the substance of the liver reduced to the sixth, or perhaps even to the eighth, part of its natural amount.

Cancerous tumours of the liver are sometimes seated so that they compress the sanguiferous vessels: M. Cruveilhier is inclined to attribute some cases of atrophy of the liver to obstruction of its nutritive vessels being produced in this way. It is probable that the compression which these masses exert on the venous system, contributes, at least, to the production of the ascites and anasarca, which attend particularly the advanced stages of this disease; and it is well ascertained that the jaundice, which so frequently occurs in this form of disease, is the consequence of the compression of the larger excretory gall-ducts. M. Cruveilhier affirms, that he has never observed cancer of the liver accompanied with jaundice, without finding the cause of it in a compression of this kind.

Symptoms and diagnosis. There are some symptoms which are not peculiar to one disease, or to one class of diseases, of the biliary organs, but common to several of these diseases, and these even of different forms, as, for example, dynamical and structural. These symptoms it is necessary to consider, in respect of the more minute variations which they exhibit, according to the internal morbid condition from which they arise. The principal are, *tumour; yellowness of the skin,* or *jaundice, with the characteristic appearance of the alvine evacuations and urine; pain; cough; dropsy; and hæmorrhage.**

1. In the diagnosis of diseases of the biliary organs, it is a matter of primary importance to ascertain the existence or non-existence of *tumour* or *swelling* in the hepatic region; and in the event of its existence, to determine the characters of the swelling. To a certain extent, simple inspection may suffice for this purpose, but manual examination is essential to accuracy of diagnosis.

In proceeding to conduct a manual examination for the detection of tumour, or enlargement of the liver, the patient should be laid on his back, with his legs flexed on his thighs, and his thighs flexed upon the abdomen. Even with the greatest precaution, the examination may excite pain, and cause the abdominal, and particularly the recti muscles involuntarily to contract, so as to render it impossible to ascertain the condition of the interior of the abdomen. With the hand not employed in the manipulation, the right false ribs and side should be

raised, and the body should be put in such a position, as will favour the descent of the liver into the abdominal cavity.

In conducting an examination of this kind there are several circumstances to be kept in mind, as a neglect of them might lead to an erroneous judgment. Thus, 1. Protrusion of the sharp edge of the liver beneath the costal parietes may be the effect, not of its enlargement, but merely of its displacement, from disease in other parts. 2. Tumours connected with other organs, as with the stomach, the duodenum, the pancreas, or even with more remote parts, may, from their position, be mistaken for enlargements of the liver. 3. It is also necessary to remember, that enlargement of this organ may be either general, all its parts being equally affected, or portions of it may undergo enlargement separately: consequently, the circumstance of a tumour being limited to the right or left hypochondrium, or to the epigastrium, is not sufficient to disprove its being seated in the liver.

When the existence of a tumour in the hepatic region has been satisfactorily ascertained, the next point is to discover whether it consists of solid or of fluid matter. This, of course, is to be determined by the degree and nature of the resistance, or by the sensation of fluctuation, which it gives upon pressure.

The diseases connected with the biliary organs, which produce a fluctuating tumour, are, hepatic abscess, serous or hydatid cyst, and distention of the gall-bladder, whether with bile or with other fluid. M. Petit, many years ago, pointed out the following grounds of diagnosis between hepatic abscess and distention of the gall-bladder. 1. The tumour of hepatic abscess is not circumscribed, but appears merged in the neighbouring parts, and as it were lost in the integuments, which are usually œdematous, whilst that produced by swelling of the gall-bladder is exactly defined and distinct, being seldom accompanied with œdema. 2. The tumour from distention of the gall-bladder is always situated beneath the false ribs, under the rectus muscle; but that depending on abscess of the liver is very variable in situation, and may occupy any part of the epigastric region. 3. There are several points of difference in respect of the fluctuation from these swellings. In distention of the gall-bladder the fluctuation appears suddenly, and its existence is unequivocal from the commencement, and is almost as manifest in the circumference of the tumour as in its centre; and after the subsidence of inflammation, it is not surrounded with any degree of hardness. In hepatic abscess, on the contrary, the fluctuation comes on slowly, and is with difficulty detected. It appears, at first, only in the centre of the tumour; and, as suppuration increases, gradually extends to the circumference, and the tumour is always surrounded by hardness and swelling.

The tumour resulting from the projection of a serous or hydatid cyst upon the surface of the liver, usually elevates a portion of the abdominal parietes, so as to be perceptible on simple inspection. Its great degree of resistance, and its great elasticity, may lead to the recognition of a tumour depending on this cause.

In respect of solid tumours occupying the hepatic region, the first question is to determine whether they belong to the liver. If the mass can be traced under the cartilages of the ribs, the presumption is strongly in favour of the liver being the seat of the disease. Hepatic enlargements, also, are necessarily fixed in their positions, whilst most of the tumours that simulate them admit of a greater or less degree of motion.

It being established that a solid tumour is connected with the liver, the next object is to ascertain its more particular nature. Under favourable circumstances we may, in some degree, determine the nature of the tumour from its hardness, its smoothness, or its more prominent inequalities. In enlargements from congestion or inflammation, the surface is smooth, without prominence or depressions. In granular enlargements, numerous inequalities may occur, in consequence of unequal development. In enlargement from cancerous masses,

numerous prominences, raising the parietes of the abdomen, may be felt; but when softening occurs in these masses, says Andral, each elevation is succeeded by a depression. The degree of permanence of the swelling may likewise assist our diagnosis. When, for example, it comes and disappears suddenly, we may infer that it depends upon congestion.

It must be borne in mind, however, in speaking of tumour as a symptom of liver disease, 1st, that all the affections of this organ (as Andral remarks) may pass through the successive periods of commencement and increase, without producing any apparent swelling; and, 2dly, that it is sometimes difficult to detect enlargement, even when it exists; particularly when considerable effusion has taken place into the peritoneal cavity, or when the large intestines are distended by fæces or wind. The operation of paracentesis in the one case, and the evacuation of the bowels in the other, may bring to light enlargement of the liver, where no positive proof of its existence could previously be obtained.

In determining the existence and extent of enlargements of the liver, considerable assistance may be derived from the practice of percussion, particularly in those cases in which the liver, in enlarging, pushes upwards under the ribs, so as to encroach upon the cavity of the chest. In a case of this kind there will be emitted a dull sound on percussion over the parietes of the chest, throughout the whole of the lower part of the right side, and sometimes (when the left lobe is enlarged) of the left side, also. Nor is auscultation without its use in cases of this description. Mr. Malcolmson has recently pointed out a loud sound, as heard through the stethoscope, between a crepitous rattle and a bleating, audible to the patient, and even to the bystanders, and accompanied by a vibration of the parietes of the thorax, communicated to the hand applied to the part, which, he is satisfied, is caused by the thin edge of the lung being compressed against the costal pleura by the enlarged liver.

2. In considering the different forms of morbid affections to which the biliary organs are subject, we have had repeated occasion to notice yellowness of the skin, or *jaundice*, as a symptom, the occurrence of which may be regarded as proving that, either in consequence of intrinsic or extrinsic diseases, of a dynamical or of a structural character, the functions of these organs are not duly exercised. But can we be led any farther by the consideration of this symptom, in determining the nature of the existing disease, than to the simple conclusion of its being seated in the biliary organs, or in their immediate vicinity? Do the characters of the jaundice vary in any respects according to the particular morbid condition on which it depends? For the most precise information which we possess on this subject, we are indebted to Dr. Bright. 1. When jaundice, according to this observant physician, arises from congestion, the countenance gradually assumes a dingy aspect, in which the purple suffusion of carbonised blood is mingled with the yellow tint of a slight jaundice. The conjunctiva is more decidedly tinged; and if the disease continue long, the jaundice sometimes completely prevails over the purple tint. 2. When the jaundice depends upon obstruction of bile in the ducts, particularly the larger ones (as from gall-stones), the skin usually displays a very vivid colour, which comes on suddenly or more gradually, and continues longer or shorter, according to the nature of the obstructing cause. This vivid colour may cease altogether, or may continue until death takes place, or it may pass gradually into a dingy green colour, giving the countenance a mulatto appearance, and which may hence be denominated black jaundice. When the obstruction of the ducts depends upon organic lesion, the countenance generally becomes gradually suffused with bile; at length, the more decided jaundice takes place, and this goes on increasing in intensity for a time, after which the colour loses its brilliancy, assumes a dark green hue, and squalid appearance, which is one of the worst symptoms. 3. In jaundice from structural disease of the liver, the change from the natural colour is usually gradual and inconstant; and the yellow tinge of the conjunctiva often precedes for some weeks any more decided indication.

In time, however, preceded by a bronzed appearance of the forehead, or the darkened areola of the eye, a jaundice bearing the lighter tints, from a yellow suffusion to a fainter, or more decided lemon hue, but still liable to considerable fluctuations, establishes itself over the whole body. 4. In jaundice from inflammation of the liver, in a day or two after the early symptoms have appeared, the conjunctiva becomes tinged, and, in a few days more, there is universal bright brilliant suffusion of the skin. In the severer cases, a most intense jaundice is diffused over the whole surface. If the disease does not prove fatal at this early period, but goes on for some weeks, the skin assumes a light lemon coloured tint, bespeaking, says Dr. Bright, a very general disorganisation of the liver. In respect to this form of jaundice, Mr. Annesley observes, "A certain degree of jaundice is often remarked in the hepatitis of Europe, especially when it terminates in abscess; but jaundice is not a frequent concomitant of hepatitis in India, unless when the ducts or gall-bladder become involved in the disease, or when it supervenes to biliary calculi, or obstruction of the ducts."

It is obvious, that of the various pathological conditions capable of producing jaundice, some are more or less transient, while others are permanent in their nature. To the former class belong the dynamical affections and the simple circulatory derangements. To the latter, a large proportion, if not the whole, of the structural alterations. In proportion, therefore, to the continuance of an attack of jaundice, is the probability of its depending upon a structural morbid condition. In some instances, as in spasm of the ducts, or in gall-stones moving backward and forward in their canals, the jaundice may be said to have a remittent or intermittent form.

The termination (often sudden) of jaundice in affections of the brain has been frequently noticed. Baglivi mentions a case of sanguineous apoplexy succeeding to jaundice from biliary concretions, and Morgagni has related several instances of jaundice, in which, at an early period of their progress, delirium and convulsions came on and terminated in death. On dissection, no morbid appearances sufficient to account for the jaundice, delirium, convulsions, and death, were discovered. Dr. Powell (*Observ. on the Bile, &c.*) has given the cases of two young females, in whom jaundice, of some continuance, was succeeded by apoplexy and death. On this subject Dr. Marsh states (*Dub. Hosp. Rep.*, vol. iii.) that it happens, not unfrequently, that patients labouring under jaundice are seized suddenly with symptoms of cerebral disease, and die phrenitic. This form of disease, he thinks, exists chiefly in persons whose nervous system has, from any cause, been previously injured and weakened. "It may be said," he adds, "that the affection of the brain was an accidental circumstance unconnected with the original disease, and arising from causes quite distinct from the presence or absence of bile in the circulating system." That jaundice is not the only, or even the principal, cause is very certain, for we often observe patients to be deeply jaundiced, and yet free from cerebral disorder: but that under certain circumstances, in certain conditions of the nervous system, phrenzy may be excited, either by bile conveyed to the brain, or in consequence of the sympathy which exists between the cerebral and hepatic systems, is an assertion, the truth of which Dr. M. conceives the facts stated sufficiently establish. In practice it is important we should be aware, that an icteric patient, who has a weak and irritable nervous system, must be closely looked after, lest alarming symptoms should unexpectedly arise; and in cases of this kind we should be very guarded and cautious in our prognosis.

In explanation of the greater tendency to coma and death in cases of jaundice, Dr. Alison remarks that we have now sufficient evidence to establish two points, 1st, the frequent occurrence of jaundice in cases where the bile ducts are pervious and appear empty after death; and, 2nd, the peculiar (I would not say either the uniform or the exclusive) tendency of such cases of jaundice, thus dependent on suppression of the secretion and retention of the biliary matter in the blood, are also those in which the nervous system is apt to be peculiarly and dangerously affected. Another important inference may be drawn

from these facts, viz. that the retention in the blood of matter destined to excretion is much more generally hurtful to the living body, than the reabsorption into the blood of matters which have been secreted at their appropriate organs, but not thrown out of the body, in consequence of obstruction to their outlets. At first view this appears improbable, but it is supported by the analogy of other facts; and if it be true, as stated by Dr. Prout, that nothing is absorbed in the living body without having been previously acted on by the fluids of the body, and undergone a process more or less analogous to digestion, this difference between the noxious qualities of excretions retained and excretions reabsorbed may be easily understood. It is probable that there may be cases where the reabsorbed bile is likewise the cause of fatal coma; and when we reflect how very variously other narcotic poisons affect the nervous system in different individuals, it is not surprising that this difference should be observed. But that the retained bile has this peculiar noxious quality, seems to be clearly shown by the very large proportion of cases of jaundice early fatal in the way of coma, in which the bile-ducts have been found pervious and empty. But whichever of these explanations be regarded as the correct one, whether in the cases in question the brain be the *protopathic*, and the liver the *deuteropathic* organ, or the reverse, the fact which they establish of a frequent connexion between the diseases of these two organs is of the highest importance in practice.

3. In conjunction with jaundice, regarded as a diagnostic symptom, it is necessary to consider the *condition of the alvine evacuations*, both in respect to their freedom and their appearance. As to their freedom, it may be observed, that Heberden, Dr. Powell, and others, agree in stating that there is no foundation for the common opinion, that the absence of bile in the intestinal canal gives rise to costiveness. The appearances exhibited by the alvine evacuations in jaundice are very various If the non-secretion or non-excretion of the bile be complete, it is obvious that the fæces must be destitute of the colour which they receive from that substance; and that, if it be incomplete, their shade of colour must vary accordingly. In judging from the appearance of the alvine evacuations respecting the cause of jaundice, it may, according to Dr. Bright, be remarked that, 1. in jaundice depending upon *venous congestion*, the dejections are not obviously deficient in bile; 2. in jaundice from the obstruction of concretions, the stools become of a pale drab colour; and in that from obstruction consequent on organic deposit, they are of the lightest drab colour, approaching to white; 3. in jaundice from chronic change of the liver, the alvine evacuations seldom present that marked deficiency of bile which is observable in some other cases; on the contrary, they vary through the different shades of brown and yellow, and are often remarkable rather for the unequal manner in which the bile is mingled, than for the absence of that secretion; the action of the bowels is generally irregular, and as the disease advances, evacuations of blood frequently take place; 4. in jaundice from hepatitis, the stools are, both in the more and less acute cases, of a light colour; but less decidedly so, and subject to greater variations, than when the obstruction is mechanical; and occasionally, after a few days, they give little evidence of the deficiency of bile. That in a particular case there should exist bilious yellowness of the skin, and yet the dejections exhibit their usual colour, shows that the affection is not of such a nature or of such a degree as to prevent the whole or a part of the bile from passing into the duodenum. This appears to be the case in venous congestion, and to a greater or less degree in the inflammatory and chronic affections of the liver. And even when there is a stone in the hepatic or choledoch duct, if it does not so exactly fill the canal but that some bile passes by, the stools, as well as the skin, may be tinged yellow. (*Bright's Reports.*)

4. It may here be remarked, that the condition of the urine becomes altered in various forms of hepatic disease. In jaundice, this secretion is of a deep yellow colour, which it may assume previously to any discolouration of the skin, and which is even present, sometimes, in diseases of the liver, in which the skin preserves its natural appearance. We may consider this symptom, therefore,

as a more delicate test of the existence of bile in the blood, than yellowness of the skin. In some cases of jaundice, the urine becomes loaded with bile, till it assumes a colour deeper than porter, but of a green tint.

5. The occurrence of *pain* in the hepatic region does not in itself constitute a conclusive proof of the existence of disease in the biliary organs; for experience has shown that pain may occur in this situation from affections of various other parts, especially from inflammation of the pleura, particularly its diaphragmatic portion; from partial peritonitis in the vicinity of the liver; from acute or chronic inflammation of the pylorus, or commencement of the duodenum; from nephritis; and from tumours developed either between the kidney and liver, or below the gastro-hepatic epiploon. M. Andral notices that sharp pains are sometimes observed in the hepatic region, which are not accounted for after death by the existence of any lesion in the liver or its excretory ducts; and which for various reasons he regards as neuralgic affections of the pneumogastric or great sympathetic nerves.

The structural disease of the biliary organs most liable to be attended with pain (next to gall-stones, inflammation, and suppuration), seems, according to Andral, to be the production of encephaloid matter in the inflamed texture of the liver. Many of the chronic affections of this organ are attended with little or no pain, as the development of hydatids, fatty degeneration, induration, hypertrophy, granulations, cirrhosis, &c. The pain in organic diseases of the liver, when it does exist, may be diffused or circumscribed. Thus, as M. Andral observes, in some cases of this kind the whole of the lower part of the right side of the chest, and the right hypochondrium, are the seat of a painful affection: in others it is felt in one or other of the following situations: 1. towards the epigastric region; 2. along the cartilaginous border of the right false ribs; 3. in a more or less limited point of the right hypochondrium, towards the lower and lateral part of the right side; 5. posteriorly on the same side, near the vertebral column; 6. in the left hypochondrium, at the space usually occupied either by the great end of the stomach, or by the spleen; 7. in different points of the abdomen, such as the umbilicus, flanks, &c. The pain may be felt on pressure only, or in particular postures, or it may be constant independently of pressure or position. It varies also in degree of severity as well as in duration.

6. *Cough* has been already mentioned as a not unfrequent symptom of inflammation of the liver. It is also occasionally observed in hepatic enlargement unattended by inflammation, and has been accounted for on the supposition, that the increased weight of the organ by dragging down the diaphragm, stretches and irritates the respiratory nerves; and it has been supposed, also, that this influence of the enlarged liver over the respiratory organs may be exercised through the medium of the stomach, in cases in which the liver, by an increase of size transversely, or from one hypochondrium to the other, produces pressure on that organ.

7. *Dropsy*, chiefly in the form of ascites, attends many diseases of the liver, being occasioned by the obstruction of the circulation through the vena portarum, to which these diseases give rise. Dropsy from this cause may be distinguished from that supervening to other diseases, as those of the heart, from this circumstance, that in cases of the latter description, as the obstruction operates on the vessels of the common circulation, the dropsical effusion commences at the extremities of those vessels, viz. in the feet and ankles, and gradually extends along the legs and thighs to the cavity of the abdomen; whereas, in diseases of the liver, as the obstruction affects the portal system, the effusion commences within the cavity of the abdomen.

It is those diseases of the liver in which that organ undergoes condensation and induration throughout its whole extent, such as the various forms of granular degeneration, that principally give rise to dropsy. M. Andral particularly insists on dropsy being an almost constant occurrence in atrophy of the liver likewise, of which, indeed, it may be the only discoverable symptom. (See *Bright's Rep.*)

8. Another consequence that may result from impeded circulation through the vena portarum, is *hæmorrhagic effusion.* Heberden observes, that in the advanced state of what he calls inflammatory scirrhi of the liver, "the blood will gush out in great quantities from the nose, the gums, the stomach, the navel, and with the stools, which is probably to be attributed to the obstruction which it meets with in the scirrhous liver." And Mr. Langstaff mentions, that he has noticed, in most organic affections of the liver, that nasal, stomachic, or intestinal hæmorrhage are not unfrequent occurrences; which he supposes to arise from excessive determination of blood to the mucous surfaces of those parts, and nature relieving their over-distention by hæmorrhagic profluvia. To these observations may be added those made by Dr. Bright, in his *Remarks on Jaundice.* That accurate observer states, that should death occur in jaundice from congestion, it will probably have been preceded by the passage of blood, more or less freely, from the lungs or the intestines; that in jaundice from organic deposit, at an advanced stage, ecchymosis takes place in various parts, and blood escapes from different surfaces; and that in jaundice from inflammatory action in the liver, the tendency to hæmorrhage sometimes comes on early, and is excessive.

Treatment. In respect of the treatment of a case of structural affection of the liver, there are obviously two points to be considered by the practitioner: 1st, how far the disease admits of being removed; and, 2dly, how far its symptoms admit of being alleviated, and its progress retarded.

Except in the case of serous or hydatid cysts, where surgical operation may be had recourse to, the only way in which we can conceive a structural disease of the liver to undergo removal, is by the re-absorption of the morbid deposit. The question for practical consideration is therefore: "When solid matters have been deposited in the liver, interstitially or in masses, so as to produce its various forms of induration and enlargement, what expectations are we warranted in entertaining of their absorption taking place either spontaneously or under the influence of remedies?"

It is obvious, that whatever uncertainties attend the investigation as to the possibility of the resolution of peculiar structural degenerations occupying external parts, these difficulties will be greatly increased when we come to pursue a similar inquiry with regard to internal organs like the liver. There is sufficient testimony to the fact of enlargements of this organ having been reduced by medical treatment; but whether, in any cases of this kind, the swelling had any other origin than that of chronic inflammation, — whether, for example, any case of cirrhosis of the liver, or of granular or fatty degeneration of that organ, has ever undergone spontaneous recovery, or been removed by medicine, — are matters respecting which our only information is of the nature of conjecture.

The conclusions at which different practitioners have arrived as to the efficacy of iodine in such cases, do not correspond. Dr. Abercrombie mentions, that in several cases of chronic affections of the liver, accompanied by jaundice, he has seen very good effects from the external use of iodine, in an ointment containing half a drachm to an ounce of axunge. A favourable statement of its efficacy has also been given by Dr. Milligan and others. Mr. Twining, on the contrary, has found this medicinal agent remarkably unsuccessful; and he points out an effect resulting from its administration in other complaints, which renders it necessary to be particularly cautious in employing it in affections of the liver. Of twenty-three Europeans, to whom he had prescribed it internally, for the cure of various diseases not considered hepatic, five became affected with pain in the right side. "The observations of our professional brethren in Europe," observes Mr. T., "afford reason to believe that iodine, administered in large doses, is liable occasionally to excite pain in the region of the liver; and in some instances, the existence of hepatitis in such cases has been proved by post mortem inspections. Dr. Christison alludes to two instances in which hepatitis occurred in persons who had recently taken large doses of iodine (reported by Rust and Zinc), and thinks it not impro-

bable that iodine possesses the power of inflaming the liver." In corroboration of this opinion, we may quote the following observations:—" A case recently fell under our own observation, in which the employment of iodine for chronic enlargement of the uterus was followed by acute pain in the hepatic region, extending thence to the right shoulder, and requiring the free application of leeches and mercurial purgatives for its removal. On the other hand, chronic enlargement of the liver, to such an extent that the organ extended below the umbilicus, the sequel of remittent fever in a youth of seventeen, was entirely dispersed by frictions with a strong ointment of iodine, and a course of purgatives." (*Brit. and For. Med. Rev.*, iii. p. 354.)

The palliative treatment to be pursued in the progress of structural affections of the liver, must have chiefly for its objects, the relief of pain, the removal of dropsical effusion, and the maintenance or improvement of the general health.

When the pain seems to depend either on the specific character of the structural alteration, as in the case of cancer, or on the pressure arising from the increased bulk of the organ, it is perhaps only from narcotics that relief can be attained. Any appearance of the pain depending on the supervention of congestion or inflammation on an existing structural affection, will induce the practitioner to have recourse to the appropriate means for removing these states. The remedies to be employed for the removal of dropsical effusion depending on structural disease of the liver, will be found detailed under Dropsy.

For the maintenance or improvement of the general health, the practitioner must mainly rely on the regulation of the *non-naturals*. With respect to the regulation of the diet, there are obviously two precautions of great importance to be attended to: 1. That, in respect of quantity and quality, it shall be of easy digestion; and, 2. When there is any tendency to febrile action, that it shall be of a strictly antiphlogistic character. With a view to the first of these objects, every thing unsuitable for a weak or dyspeptic stomach ought at once to be discarded: the diet should consist of farinaceous substances during the progress of acute attacks, and this should be observed in a great degree likewise in the more chronic forms of liver disease. With the farinacea may be combined a due proportion of milk, to which, if necessary to make it agree with the stomach, fifteen or twenty drops of the aqua potassæ, or a third part of lime water, may be added. At dinner, a small quantity of soup, or a bit of plain dressed animal food, may be substituted for the milk. Where the addition of a stimulant seems desirable, a little wine and water, or probably still better, a proportional quantity of spirits and water, may be taken.

It is a matter of primary importance in this class of diseases to keep the bowels open with laxative or purgative medicines. The choice of these remedies must be left to the discretion of the practitioner, guided by the previous habits of the patient, and the visible effects which they produce.

Warm clothing is at all times an object of great consequence in the treatment of chronic diseases of the liver, as, by favouring the course of the circulation to the extremities and surface of the body, it diminishes the risk of the supervention of an acute attack upon a chronic affection, which is always to be apprehended. It is beneficial also with a view to the promotion of digestion; for "the stomach," as Dr. Saunders remarks, "is greatly assisted in its energy and power, by warm clothing, especially on the lower extremities of the body."

When the disease has been brought on by the unhealthy character of the climate or locality, a change to a better residence will of course be conducive, if not essential, to recovery; but this remark applies more particularly to chronic affections depending on congestion or inflammation, than to those in which there exists a positive structural alteration. Where the diagnosis is doubtful, the precaution is not to be neglected.

DISEASES OF THE PANCREAS.

Alterations in the pancreatic secretion. — Congestion and hæmorrhage. — Inflammation and its consequences.—Hypertrophy. —Atrophy.— Induration. —Cartilaginous transformation. —Fatty transformation. — Steatomatous concretions.— Tubercles. — Serous cysts and hydatids. —Scirrho-cancerous degeneration. — Melanosis. —Calculous concretions. —Diagnosis and symptoms of the diseases of the pancreas. — Causes. — Treatment.

The pancreas resembles the liver in being a secreting gland, which discharges into the same portion of the intestinal canal, and in many instances by the same orifice, a fluid that has an important influence in the process of assimilation. We shall offer a few observations on alterations of the pancreatic secretion, before entering on the consideration of its structural diseases.

Alterations in the pancreatic secretion. The secretion of the pancreas may be morbid in respect of quantity or of quality. In respect of quantity, it may be morbid by excess or by deficiency. In the event of the pancreatic secretion experiencing a considerable increase in quantity, it is obvious, that after its excretion into the intestinal tube, unless it be re-absorbed by the vigorous action of the lacteal vessels, it must be discharged by one or other extremity of the alimentary canal. The resemblance which the alvine evacuations have exhibited, in many cases of diarrhœa, to the salivary and pancreatic fluids, has led many practitioners to entertain the belief that an excessive pancreatic secretion is not an uncommon cause of this affection. An excessive secretion by the pancreas may, from the analogy of other glands, be supposed to occur independently of any structural alteration of that organ ; but it is alleged, that in some of its structural alterations, a diarrhœa is liable to supervene, which exhibits more or less the characters of the pancreatic secretion. The cases in which it has been supposed that an excessive pancreatic secretion has been discharged by the mouth, seem liable to greater doubt than the cases last alluded to, from the obvious circumstance that the fluid thus discharged may have actually proceeded from the buccal salivary glands. Where, however, the discharge of a fluid exhibiting those characters which are common to saliva and pancreatic juice, is accompanied with distinct marks of inverted action of the œsophagus, as is said to have been observed in several instances, it may reasonably be concluded that the pancreas has had a share in its production ; more especially if there occur, at the same time, symptoms that seem decidedly referrible to that organ.

As dropsical effusions are occasionally removed by increased renal secretion, so it has been supposed, that in those in which the removal of the dropsical affection has seemed to depend on increased watery discharge from the intestinal canal, this discharge has, in its turn, depended on an excessive secretion from the pancreas, either occurring spontaneously, or in consequence of the action of medicinal substances capable of stimulating that organ, as, for example, of tobacco. In some of these instances, the supposed pancreatic secretion has come away in the form of salivation or vomiting ; in others, in the form of watery alvine evacuations.

In some experiments in which Brunner extirpated the pancreas it was found that the alvine evacuations became indurated and scanty ; and it has hence been inferred, that these morbid conditions may, in some instances at least, be attributable to a deficient pancreatic secretion.

In cases in which an increased secretion from the pancreas has been supposed to have occurred, this fluid has seemed to exhibit proofs, by its action on the alimentary canal, as well as by its taste, of its having undergone changes in its qualities. It is well known, that in that form of dyspepsia, termed Pyrosis or Gastrorrhœa, there is a fluid ejected from the stomach, which is usually

tasteless, though sometimes slightly acid. The production of this fluid has generally been ascribed to an increased and altered secretion of the glands of the mucous membrane of the stomach; but some pathologists are inclined to, think that, in some cases at least, this fluid may be the produce of pancreatic secretion. M. Guersent has been led to conclude that the morbid acid secretion in pyrosis is not always formed in the stomach or intestinal canal, but sometimes by the salivary glands; and that this is particularly the case in persons labouring under this disease, whose teeth exhibit proofs of having been destroyed by the action of acids. It has, therefore, been thought not unreasonable to conclude that the pancreas, which so much resembles the salivary glands in structure and function, may experience similar modifications in respect of the fluid which it secretes.

Whatever foundation there may be for these suppositions as to the pancreatic origin of the profuse watery discharge which occurs in pyrosis, the liability of the pancreatic secretion to experience vitiations,—which might, indeed, be inferred from the analogy of other glandular secretions, and particularly from what has been recently ascertained respecting the morbid conditions of the saliva,—is plainly shown in the occasional formation of calculous concretions in the pancreatic duct.

It has been supposed, that in those cases of hysterical ischuria, in which a urinous fluid has been discharged by vomiting, the explanation may be found in the pancreas acting vicariously for the kidneys, so as to secrete a fluid similar to urine; and that the salivary glands of the mouth may participate in the same vicarous action.

Congestion and Hæmorrhage. That the pancreas must be liable to congestion and hæmorrhage, there can be no doubt; but few opportunities seem to have occurred of witnessing, by examinations after death, the morbid alterations produced by these states in the structure of this organ. A case related by Storck, in which the pancreas was so large and heavy that it exceeded thirteen pounds in weight, affords one of the few, if not, indeed, the only example that has been recorded of pancreatic hæmorrhage. On cutting into this mass, it was found to consist merely of a sac filled with blood, partly grumous, partly coagulated, and beginning, it is stated, to become organised.

Inflammation. The number of cases in which the pancreas is found, on post mortem examination, to be in a state of *acute* inflammation, is certainly not large. From those cases in which an opportunity has occurred of examining the pancreas in this condition, it appears to be characterised by redness of the substance of the organ, and by injection and infiltration of its interlobular cellular tissue, rendering the lobules more distinct and more dense than natural. In the more intense degrees of inflammation, the pancreas is said to acquire a brownish red colour, and its tissue to become softened, and more easily torn than in its sound condition. Mr. Lawrence says of a pancreas which he had an opportunity of examining, and which he regarded as being in a state of active inflammation, that it was throughout of a deep and dull red colour, which contrasted very remarkably with the bloodless condition of other parts; it was firm to the feel externally, and when an incision was made into it, the divided lobules felt particularly firm and crisp. The texture was otherwise healthy. (*Med. Chir. Trans.*, vol. xvi.)

When the pancreas has been the seat of *chronic* inflammation, it is said to acquire a great increase in the density of its tissue, which swells, becomes more dry and elastic than natural, and of a reddish and whitish yellow colour. Occasionally, also, as a consequence of chronic inflammation of this organ, there are found red spots and infiltrations of blood, as if incorporated in the condensed cellular tissue; but this alteration does not seem to be very constant.

Inflammation of the pancreas may terminate in *resolution*; or it may give rise to the effusion of *coagulable lymph* upon its outer surface, or of *pus* into its substance. It is said in some instances to terminate in *gangrene*.

In consequence of the effusion and subsequent organisation of coagulable

lymph upon the surface of the pancreas, it has occasionally been found covered by a false membrane of great consistence. By the extension of the adhesive inflammation to some of the neighbouring organs, as the stomach, the duodenum, the liver, the spleen, the mesentery, the mesocolon, &c. bands are occasionally formed, connecting the pancreas to one or more of these organs, which sometimes acquire so great a degree of hardness, as to be with difficulty divided with the scalpel.

When an abscess is forming in the substance of the pancreas, the pus, according to Gendrin, is infiltrated into its interlobular tissue. The glandular granules are very soft, of a reddish grey colour, and sometimes manifestly diminished in size, although the whole organ is usually, though not invariably, enlarged. The investing capsule is itself much inflamed, and sometimes thickened by the formation of false membrane. When the process of suppuration is completed, the pus is generally collected in one cavity. In most cases, the inflammation of the pancreas being but partial, the pus is infiltrated into a cavity of moderate size, and being intermixed with the pancreatic fluid, exhibits the appearance of purulent matter combined with a clear yellowish fluid, and with a whitish curdy substance, the most dependent part of the cavity being occupied with a grey powdery pus. Suppuration of the pancreas sometimes proceeds to such an extent that its texture is almost entirely destroyed. The character of the purulent matter, in such cases, seems to be various. According to Gendrin, in large purulent deposits, it is commonly inodorous and creamy: Portal, on the other hand, states, that in complete suppuration of the pancreas, the pus is sometimes of an intolerable smell: it has been found of a greenish colour, but usually it is of a greyish white, like that of other abscesses, unless it be the result of scrofulous suppuration, in which cases the pus is whiter and grumous. In some instances, the substance of the pancreas being completely destroyed, the purulent matter is contained in a membranous envelope, formed by the cellular texture which covers the organ. Portal has seen more than two pounds of pus contained in a sac of this description.

The occurrence of abscesses in the substance of the pancreas, or in the cellular texture around it, has been observed in various diseases of organs or textures more or less remote. Portal speaks of it as having been observed repeatedly in diseases of the testicles; and mentions one case in particular, in which, after the extirpation of a testicle and the ligature of the spermatic cord, a large quantity of pus was found in the cord, and a considerable abscess surrounding the pancreas; and he refers to Antoine Petit as adducing different examples of this kind in support of his objections to the practice of ligature. M. Tonnellé mentions two cases of puerperal peritonitis, in which pancreatic abscess occurred.

The contents of a pancreatic abscess may be discharged in various directions. Sometimes they escape into the cavity of the abdomen; sometimes they pass into the stomach; and sometimes into the duplicature of the mesocolon, where they may be retained as in a sac, or, having perforated one of its laminæ, may be effused into the cavity of the abdomen. It is supposed also that the pus of a pancreatic abscess may find its way into the intestinal canal, and be discharged by stool, without any obvious communication being established between them. Thus, in a case communicated by Dr. Haygarth to Dr. Percival, in which, on dissection after death, the pancreas was found to contain a considerable abscess, during life, blood, and at length fetid pus, had been discharged by stool.

In respect of the pancreas, as of other internal organs, it is necessary to be very cautious of admitting the occurrence of *gangrene* as a consequence of inflammatory disease; many different alterations having been described, or referred to, under that name. Portal goes so far as to allege that gangrene of the pancreas is a frequent consequence of its inflammation, and that he has met with it in several instances: in one case, which he particularly specifies,

the pancreas was found on examination to be of a violet red colour, softened, allowing a blackish fetid humour to exude from its external surface; in short, says he, it was gangrenous almost through its whole extent. Gendrin quotes what he conceives to have been a case of gangrene of the pancreas, occurring after chronic inflammation; and suggests it as probable, that in this, as in other tissues, acute inflammation passes readily and completely into the state of sphacelus only in cases in which the organ has been previously weakened by chronic disease.

Hypertrophy. The pancreas seems to be liable to the state of hypertrophy, understanding by that term an increased amount of its natural substance; but from the cellular substance which intersects its glandular structure participating in the affection, the viscus, in undergoing hypertrophy, loses a good deal of its natural appearance, and is converted into a hard white mass, intersected by opaque membranous septa, so as to give it a scirrhoid character; and hence, by some, this morbid alteration has been considered as the first step towards scirrhous degeneration, and by others as actual scirrhus.

Atrophy. The pancreas may undergo such a degree of atrophy as to reduce it to the half or to the fourth of its natural size. Atrophy of the pancreas may occur as a consequence of disease of the gland itself; but most usually it is attributable to pressure caused by a morbid alteration of the liver, or of the stomach, or of some other neighbouring organ, as aneurism of the abdominal aorta. It has been suggested, that in cancerous affections of the stomach, with obstruction of the pylorus, the atrophied state of the pancreas, which is frequently observed, may be attributable, in part at least, to the inactivity of this organ, in consequence of its secretion being no longer stimulated by the arrival of the chyme in the duodenum.

Induration. The pancreas is sometimes found of a firmer consistence than usual, without any perceptible alteration of its structure. It has been alleged, that in these cases the glandular granules are the seat of induration, whilst the surrounding cellular texture remains of a healthy character. It is not uncommon, we believe, for induration of this kind to disappear, as happened in Mr. Lawrence's case, at no considerable period after exposure of the parts to the air. The pancreas has been found also, on various occasions, in a state of preternatural softness.

Cartilaginous Transformation. A considerable number of cases has been recorded, in which the pancreas has been found *cartilaginous.* In nearly all these instances, one or several of the surrounding organs had undergone the same transformation; but in some rare examples, the pancreas has been the exclusive seat of cartilaginous degeneration.

Fatty Transformation. It would appear, from some cases that have been recorded, that the pancreas may undergo, in whole or in part, transformation into a fatty tissue; but, as Cruveilhier has remarked, this state, which is very rare, must not be confounded with the accumulation of fat in the laminous texture, which unites together the lobes and lobules of the pancreas.

Steatomatous Concretions. Portal states, that the pancreas is sometimes found full of concretions truly steatomatous, hard or softened, white like suet, or yellowish like honey: sometimes the pancreas is enlarged by this matter throughout its whole substance, and sometimes only in particular parts. Those who have died of scrofula, and in whom the glands of the neck, axillæ, groins, or mesentery, were obstructed, had likewise the pancreas equally affected. He mentions a particular case, in which the mesenteric glands were full of steatomatous concretions, and in which the pancreas, besides being enormously enlarged and full of similar concretions, was covered by one of the consistence of suet, and more than five or six lines in thickness. In this case, the surrounding cellular texture, the mesocolon, and the parietes of the stomach, were cartilaginous and thickened, in consequence, he supposes, of the pressure of the tumour. Portal states, however, that the pancreas has been found affected, when no marks of scrofula were observable in any other part of the body.

The steatomatous concretion of Portal seems to be identical with the *tubercle* of the present day; and accordingly, both in the human subject and in the lower animals, tubercles of the pancreas have been occasionally met with, particularly in cases in which the lungs had undergone a similar degeneration. M. Lombard states, that of one hundred cases of tuberculous disease in children which he examined, he found, in five, tubercles existing in the pancreas.

Serous Cysts and Hydatids. With regard to serous cysts and hydatids, it does not appear that they are of frequent occurrence in this gland.

Scirrho-cancerous Degeneration. From the recorded cases of morbid alterations of the pancreas, it would appear that scirrho-cancerous degeneration is the one most frequently met with. In a large proportion of cases of this affection, other organs, no doubt, have been found simultaneously diseased; but in some of these, at least, the pancreas has probably been the primary seat of cancerous disease, and in other instances, the affection has been entirely confined to that organ. Dr. Bigsby enumerates twenty-eight cases of carcinoma of the pancreas, recorded by different authors, which he conceives to have been idiopathic; and in eight of these, which were of long standing, the carcinomatous disease did not extend beyond the pancreas. There is every reason, Dr. Bigsby conceives, to believe that carcinoma of the pancreas commences in simple induration; for such a condition, either simple, or combined with carcinoma, in some one or several of its forms, is not unfrequently met with. In its carcinomatous degeneration, the pancreas usually undergoes enlargement; and on some rare occasions, even to such an extent as to equal the liver in its dimensions. Dr. Bigsby has met with only two cases, on record, of carcinomatous degeneration of the pancreas, in which it is distinctly stated that the gland had not increased in size. The carcinoma may occupy the whole of the pancreas, but it is in general confined to a part; it is often diffused irregularly and with undefined boundaries through the organ, which is, in its other parts, merely indurated. In the cases that have been published, its peculiar texture is usually termed, concisely, *scirrhus.* Where it is characterised with greater minuteness, it is said to be, in the first or hard stage, gristly, dense, and heavy, like cow's udder.

Of the twenty-eight cases analysed by Dr. Bigsby, in seventeen the disease had not arrived at the stage of softening, although some of them had existed for years; it was purely scirrhus. In five cases, he states, the scirrhus had at the time of death passed into the soft state called cephaloma by Dr. Carswell, and medullary sarcoma by previous writers: some parts, however, were as hard as cartilage; but the others had all the pulpy, pale yellow, brain-like character of the second stage of scirrhus. In one instance, death took place from sudden hæmorrhage, and a large and deep ulcerated cavity was found in the cephalomatous head of the pancreas, communicating by a wide opening with the duodenum. In another, the pancreas was changed into a sac, with a few shreds of cephaloma here and there on its sides, and much brownish matter, like coagulated blood. And, lastly, in two cases no vestige of any form of scirrhus remained, the gland being altogether in a state of cancerous ulceration.

Melanosis may occur in the pancreas, as in all the other organs of the body.

Calculi. Calculous concretions are occasionally found in the pancreatic duct and its branches, which resemble those of the salivary glands. Some authors, as Mondière, speak of concretions occurring in the substance of the pancreas; but it seems probable that, as in the case of the calculi of the tubuli biliferi, the concretions referred to, were actually seated in the minute ramifications of the pancreatic duct. Pancreatic calculi are usually white, but occasionally black; they vary much in shape, being sometimes round, and sometimes irregular; their size ranges from that of a pea to that of a hazel nut, and their number from seven or eight to twenty. Gendrin mentions, that the pancreatic duct is sometimes clogged, not with distinct concretions, but with a chalky powder. In respect of chemical composition, it seems probable that pancreatic calculi are liable to some variations. Dr. Pemberton

states, that a calculus from the human pancreas, with which he had been favoured by Dr. Baillie, consisted entirely of carbonate of lime; but that Dr. Wollaston, in analysing a calculus from the pancreas of an ox, proved it to consist of phosphate of lime. Portal mentions, that in a case in which he met with a dozen of light, round, whitish calculi in the pancreas, he found that when he reduced one or two into coarse powder, and threw this into boiling water, it readily dissolved; and Fourcroy states, as the results of his examinations, that pancreatic concretions are composed of phosphate of lime, combined with some animal matter, just as is the case with salivary calculi.

Diagnosis and Symptoms. In respect of the pancreas, as of every other organ, *diagnosis* has a twofold object: first, to ascertain the symptoms by which the practitioner may be led, in particular cases, to infer that the disease is actually seated in that organ; and, secondly, to determine by what symptoms its several diseases may be distinguished from one another. It must be admitted, that in both of these respects, diagnosis, as respects the diseases of the pancreas, is but little advanced. The functions which the fluid secreted by this organ performs, are perhaps not very well understood; and at all events, their execution is far removed from observation. The position of the organ, likewise, is such, that variations in its physical conditions are not easily detected till they attain a very considerable degree. In fact, most of the *symptoms* which present themselves in cases of pancreatic disease, arise, not primarily from alterations in its own conditions, but secondarily from the disturbances which they occasion in the surrounding parts. These, it is obvious, must vary according to the organ which happens to be principally affected; and, in particular, according to the organ which, in cases of enlargement of the pancreas, happens to sustain the greatest degree of compression. This may be the pylorus, or the lower portion of the duodenum; or the choledoch duct; or the vena portæ and its branches; and sometimes it is the aorta upon which the compression of the enlarged pancreas most immediately acts, and in which the most striking symptoms of pancreatic affection have their more immediate origin. The community between the diseases of the pancreas and those of neighbouring organs, in respect of several symptoms, has led some practitioners to conceive that it is on the symptoms which are absent, rather than on those which are present, that the diagnosis of pancreatic diseases must mainly be founded; but, as Dr. Bright has shrewdly shown, to diagnosticate, on this principle, the diseases of the pancreas, would require a more accurate knowledge of the symptoms of the various diseases of the different organs by which it is surrounded, than we can as yet pretend to possess.

With respect to acute inflammation of the pancreas, the following are the symptoms which have been most frequently observed in cases of this nature; viz. dyspepsia; anxiety towards the epigastric region, with heat, and fixed, obtuse, and deep pain, extending towards the right hypochondrium and to the chest; thirst; sense of heat in the throat; acid eructations, pyrosis, gastrodynia, fits of nausea, and sometimes vomiting of ropy and saltish fluids; most generally constipation, sometimes diarrhœa, particularly in the cases in which the inflammation of the pancreas succeeds to salivation; in other instances, salivation, instead of preceding the disease, is a sympathetic effect of it. Frequently, in such cases, there is said to be swelling of the parotid glands. The alvine evacuations are frequently watery, and bear more or less resemblance to saliva. When the inflammation is very intense, acute pains are experienced at the epigastrium: most frequently, in this case, there is tumefaction of the pancreas; and there may sometimes be felt a circumscribed tumour, nearly circular, sensible to pressure, and which may, to a certain extent, be distinguished from that produced by scirrhus of the same organ, in as much as it is found to yield under continued pressure. Lying on the back is painful, and often impossible: the pain is increased by coughing, by inspiration, by a full state of the stomach, and by lying on the left side. The tongue is whitish, and does not exhibit the

appearance of redness that is observed in gastritis. There is seldom any great degree of fever.

The symptoms which are most usually met with in the different organic alterations of the pancreas, and which singly, or variously combined, furnish the positive materials of which the practitioner has to avail himself in endeavouring to detect the presence and to determine the nature of these affections, are, pain, constipation, diarrhœa, salivation, vomiting, jaundice, tumour, and emaciation. Dr. Pemberton states, that in all the cases of diseased pancreas, as ascertained by examination after death, which had fallen under his notice, there had always occurred, during life, more or less deep-seated pain in the region of the stomach, with sickness and emaciation; so that he was inclined to believe that, in diseased pancreas, these symptoms are never wanting; and such, indeed, he remarks, is the opinion which medical men have commonly entertained. Dr. Abercrombie mentions, that of twenty-seven cases of chronic disease of the pancreas, which he finds described by various writers, six were fatal, with gradual wasting and obscure dyspeptic complaints, without any urgent symptom; in eight, there was frequent vomiting, with more or less pain in the epigastric region; and thirteen were fatal with long continued pain, without vomiting. Dr. Abercrombie also remarks, that it does not appear from this analysis, that any distinct relation can be traced betwixt the urgency of the symptoms and the degree of enlargement, for enlargement existed in a great degree, in some of the cases, in which the symptoms were slight and obscure; and there was hardness, with little or no enlargement, in others, in which the symptoms were defined and violent.

Causes. With respect to the causes on which diseases of the pancreas may depend, these may be either agents acting primarily on this organ, or diseases of other organs extending to it, or, as is supposed sometimes to happen, transferred to it by metastasis. From the analogy, in respect to structure, of the pancreas and salivary glands, it has been thought probable that those substances which excite the latter class of glands to excessive action, such as mercury and tobacco, may exert a similar influence over the pancreas; and accordingly it has been alleged that the use of these substances is not unfrequently productive of irritation and consequent inflammation of this organ. Alcoholic liquors taken in immoderate quantity, and purgatives frequently repeated, have also been mentioned as frequent causes of inflammation and other diseases of the pancreas; but it may be doubted whether, in such cases, the pancreatic disease was primary, or whether it commenced in the stomach or duodenum, and afterwards extended to this gland. The long continued administration of bark in intermittent fevers has been mentioned by some authors as a cause of disease of the pancreas; but it may be doubted whether this is not rather the consequence of the prolongation of the fever, than of the medicine employed for its removal. Several cases have been observed, which seem to favour the idea that inflammatory affections of the parotids may, by metastasis, be transferred to the pancreas.

Treatment. The plan of treatment to be pursued in cases of disease suspected to have its seat in the pancreas, presents little that can be considered as peculiar. In an acute attack of inflammation of this organ, recourse must be had to antiphlogistic measures, comprehending general bloodletting, when the patient affected is strong and plethoric, local bleeding by leeches, or cupping, rest, strict diet, emollient cataplasms, &c. After the inflammation has been diminished by these measures, blisters may be applied to the epigastric region. It has been suggested, that in cases in which symptoms of irritation of the pancreas have succeeded to sudden disappearance of inflammation of the parotid gland, a blister should be applied to the organ that had been primarily affected.

In the treatment of the chronic inflammations and organic alterations of the pancreas, we are in a great measure reduced to palliative means. We must endeavour therefore to combat, by the appropriate remedies, the symp-

toms which are most urgent. The treatment of scirrhous affection of the pancreas, observes Dr. Sewell, can, it is evident, be only palliative. The principal indications are to alleviate the pain, to restrain the vomiting, and to correct the acidity of the stomach. Mondière thinks that it is particularly on external revulsives that reliance must be placed in the chronic pancreatic diseases. The application of blisters to the epigastrium very generally produces relief. He is himself disposed to think that the moxa, as exerting a more energetic action than blisters, ought to be preferred. The use of opium may be required to diminish the intensity of the pains by which the diseases of this organ are occasionally accompanied. Mercurial frictions, if not the internal use of mercury, have been recommended, as means of cure for enlargements of the pancreas; but if there be grounds for the suspicion that mercury is liable to excite disease in this organ, it is obvious that its employment as a remedy, in cases in which such disease already exists, must be conducted with great circumspection.

DISEASES OF THE SPLEEN.

Congestion and inflammation. — Purulent formations. — Gangrene. — Hypertrophy. — Atrophy. — Induration. — Softening. — Rupture. — Tubercle. — Serous cysts and hydatids. — Symptoms. — Causes. — Treatment.

Our ignorance of the function, or functions, which the spleen is destined to perform in the animal economy, supersedes any attempt to apply to its diseases the distinction into those that are functional and those that are structural. We may therefore turn our attention at once to the structural affections of this organ, including those in which there is simply a disturbance of its circulation, and those in which its nutritive secretion is morbid in respect of the quantity or the quality of its products.

Congestion and Inflammation. That the spleen is liable to be the seat both of congestion and of inflammation, is well established But what appearances inflammation of the spleen presents in its early stages, before it has advanced to its more characteristic terminations, such as the effusion of lymph or of pus, so as to enable us to distinguish it from simple congestion, we have not the means of determining. Even of those cases in which indubitable marks of inflammatory action in the spleen are met with on examination after death, many run their course without exhibiting any symptom distinctly indicative of the existence of inflammation; so that it is only on dissection that the actual nature of the disease is ascertained. And, of course, in cases in which the morbid appearances are not of so marked a character, where, in consequence of the peculiar appearance and colour of the organ, it may be impossible to determine, from mere inspection, whether these appearances be referrible to congestion or to the early stages of inflammation, we cannot expect the symptoms that had occurred during life to have been more distinct and characteristic than in cases in which the inflammatory action is proved by its effects to have been more decided.

The difficulty of distinguishing, both by the symptoms that occur during life, and by the appearances found after death, between congestion and inflammation of the spleen, is probably increased by the liability of the former of these states to pass into the latter. That congestion of the spleen frequently repeated, or proceeding to a great degree, should be liable to induce inflammation of the organ, seems, indeed, a very probable supposition, and is maintained by Dr. Bree. (*Med. Chir. Trans.*, vols. ii. and iii.) The difficulty of recognising the characters of inflammation of the spleen, in examinations after death, is increased by the fact that it occurs most frequently in a chronic form; active inflammation of the substance of the spleen being rarely observed.

Hypertrophy. There is no organ of the body so liable as the spleen to undergo variations, in respect of size and consistence, singly or conjointly and in every possible degree; that is to say, the spleen may be of its natural consistence, or harder or softer than natural, while it retains its natural dimensions, or while it undergoes a great increase or a great reduction of its bulk. Very generally, however, increased or diminished consistence is accompanied with enlargement of the spleen.

Three principal forms of enlargement of the spleen have been observed:— 1. that in which there seems to be no alteration in respect of consistence; 2. that in which the texture is, in a greater or less degree, softer than natural; and, 3. that which is attended with more or less of induration. What the morbid processes are, by which each of these forms of enlargement is effected, and, in particular, what share congestion, hypertrophy, and inflammation, respectively, have in their production, is a point about which pathologists are not agreed, and which seems, indeed, by no means easy to determine.

Viewing the subject on the ground of analogy with other organs, we might be disposed to believe, that when the spleen is enlarged without being softer or harder than natural, this must depend on hypertrophy; that when, in undergoing enlargement, it becomes softer than natural, this may depend on congestion or on the early stages of inflammation; and that when it is indurated as well as enlarged, this effect may depend either on simple hypertrophy, or on the more advanced stages of inflammation, in which there occurs an effusion of coagulable lymph. M. Andral takes an entirely different view of this subject. In conformity with certain opinions entertained by him respecting the important part which the contents of the cells of the spleen perform in the morbid alterations of this organ, he regards the changes in its consistence to depend on changes in the blood; conceiving that softening depends on the blood having lost its accustomed consistence, and induration on the blood having acquired a remarkable density.

Softening. Enlargement of the spleen, accompanied with softening, is a morbid condition which has been very frequently observed and described, particularly in connection with intermittent fevers, of which it is a very common attendant. In its most advanced degree, it presents, on external examination, the character of a large clot of blood inclosed in a thin membrane. If we attempt to lift the spleen when in this extreme degree of softening, the slightest touch is sufficient to tear it, and the organ breaks down in the hands; its proper texture having entirely disappeared and been replaced by black blood, a putrid gore, or a mud-like, inorganic pulp, sometimes colourless, and sometimes of a chestnut brown colour.

A spleen which has undergone this change, though generally, is not invariably, enlarged. According to Cruveilhier, the spleen never acquires so great a size in this degeneration as in induration, being seldom found to exceed thrice its natural bulk. Softened spleens, however, have been met with, which weighed from seven to eight pounds.

The extreme state of disorganisation which we have noticed, does not take place by an immediate transition from the healthy condition of the organ. According to Bailly, who has very fully described this alteration, and some of its consequences, as observed by him in the intermittent fever of Rome, the first degree of alteration consists in the spleen assuming a deeper colour than is natural to it; in a short time, a caseous-like matter can be expressed from its texture; in the next stage, this texture admits of being easily torn, the cellular tissue is destroyed, and the parenchyma is now nothing but a fluid, in which we still feel some filaments; at a later period, these filaments disappear, and the spleen is reduced to the state of a membranous sac filled with a greyish black fluid, which, in some cases, is so abundant as to render it hard and resistant. Whether this state of the spleen is to be regarded as the effect of mere congestion, or of inflammation, is still disputed by pathologists.

Rupture. After the spleen has attained to an extreme degree of softening, it sometimes happens that its investing membrane, being apparently overstretched by its fluid contents, ruptures, and the contents escape into the cavity of the abdomen.

Rupture of the spleen occurring as a consequence of external injury, whether in the way of pressure or of a blow, has not unfrequently been observed. It is probable, that, in a large proportion of such cases, the organ has, previously to the injury, experienced a greater or less degree of the disorganising softening which we have described; the more so, that the injury which produced the effect has, in many instances, been slight. Even spontaneous rupture is alleged by Morgagni to have occurred in a case of this kind.

Induration. When the spleen assumes the state of induration, this is sometimes accompanied with enlargement, sometimes not. The general characters which indurated spleen presents, have led to its being compared, in some instances, to muscular flesh, and in others to the substance of the liver, or to that state of the lungs in which they have undergone the degeneration usually

termed hepatisation. When the spleen has undergone condensation, it varies much in respect of its friability. But this fragility, as Cruveilhier remarks, at length disappears, and is succeeded by a cohesion, or compactness, such as is not seen in any other texture, except as the effect of fibrous transformation. If it be difficult to distinguish the morbid appearances exhibited by inflammation of the spleen in its early stage, from those of congestion, so, as has already been hinted, it is a matter of considerable difficulty, when the solid substance of the spleen is obviously increased in amount, to say whether this depends upon a simple process of hypertrophy, or excessive nutrition, or on an inflammatory process terminating in the effusion of coagulable lymph, or on these two processes conjoined.

Purulent Formations. The spleen is sometimes found to be the seat of one or more collections of purulent matter. In many instances, certainly, the formation of these is attributable to suppurative inflammation of this organ; but purulent deposits occasionally take place in the spleen, as well as in the liver, in cases of injury of remote parts; and, as some have been disposed to believe, without inflammation occurring in the organ itself, but simply in consequence of the transportation to it of pus that had been formed at or near the seat of the primary injury. The proportion of cases in which inflammation of the spleen terminates in abscess, has been very variously estimated. Great variety occurs in the extent of the portion of spleen which an abscess, when single, occupies, in the number of abscesses that form, in the dimensions to which they respectively attain, and in the part of the organ in which they are situated. Abscesses of the spleen, not bounded by any distinct cyst, sometimes acquire a very great size; and, indeed, the whole viscus has been found converted, as it is said, into pus; its coverings serving merely to hold the contained fluid. An abscess of the spleen may, like that of the liver, in cases in which it does not contract adhesions, discharge its contents into the cavity of the abdomen. But during the continuance of inflammatory action of the spleen, extensive adhesions sometimes take place between this organ and the parietes of the abdomen, the diaphragm, the stomach, the liver, and even the colon, and the kidney; and in such cases, when pus has been formed, it may effect different modes of escape, into the neighbouring organs or cavities, or to the exterior of the body. Abscesses of the spleen, like those of the liver, have sometimes a double outlet.

Gangrene. Though gangrene of the spleen was frequently mentioned by the older pathological anatomists, there can be little doubt that in this, as in many other instances, they employed the term to designate a dark and softened condition of the organ; for true gangrene, if it ever occur in the spleen, must certainly be exceedingly rare, though abscesses of the spleen, like those of the liver, sometimes assume a sloughing character.

Tubercle. When the lungs are the seat of tubercular degeneration, the same morbid alteration is not unfrequently formed in the spleen, particularly in young subjects. It does not seem very easy, however, to distinguish between the development of tubercles in this organ, and the degeneration to which certain round, whitish corpuscules are liable, that are regarded by many anatomists as forming one of the constituent elements of the spleen in the state of health, and which, by several, if not all, of these authorities, are considered and designated as glandules. According to Heusinger, these bodies are liable to undergo the following changes of structure:—1. The obviously membranous glandules may, he says, be filled with an albuminous substance of variable consistence, sometimes very fluid, but sometimes of a considerable degree of hardness, like albumen hardened in spirit of wine; 2. they may be filled with pus, or with a caseous-like substance; 3. they have been seen cartilaginous; and, 4. they have been found ossified.

Serous Cysts and Hydatids. The spleen is liable to undergo the various forms of cystic degeneration; but it would appear that, in few instances only, do the hydatids found in connection with the spleen originate in its substance; most of

them developing themselves in the gastro-splenic epiploon, or in cysts formed by the peritoneal coat of the spleen, and only involving this organ in their progressive enlargement. Like hydatids of the liver, those of the spleen may be discharged, in consequence of the rupture of their containing cysts, in various directions.

Atrophy. The spleen sometimes experiences a remarkable degree of atrophic diminution, so as to be reduced to the size of a walnut, or even less. The consistence of this organ in a state of atrophy may be increased or diminished, or it may remain unaltered.

Symptoms of diseases of the Spleen. Considering the obscurity of the functions of the spleen, its position, and the frequency with which enlargement constitutes an element in its morbid conditions, it is not surprising that external tumour should be one of the symptoms on which most reliance is placed in recognising the diseases of this organ.

Tumour depending on enlargement of the spleen may occupy, 1. the left hypochondrium; 2. the flank of that side; 3. the epigastrium; 4. the umbilicus; and, 5. it may pass beyond that point, extend toward the right flank, and occupy the iliac fossæ of the hypogastrium. The enlarged spleen produces a smooth, oblong, solid tumour, felt immediately beneath the integuments, very generally movable, feeling rounded at its posterior part, and presenting an edge more or less sharp in front, where it is often notched, and divided by fissures. But a considerable degree of enlargement may exist, without its forming any projection beneath the cartilaginous border of the ribs; in which case its existence can be ascertained during life, only by the dull sound emitted on percussion of the chest at its lower lateral portion. Even when tumour exists in the region of the spleen, it may be a matter of some difficulty to determine whether it actually proceeds from that organ, and if so, whether it depends upon the spleen itself being in a state of disease; for sometimes the spleen forms a tumour, without being enlarged, in consequence of an effusion into the pleura pushing down the diaphragm into the hypochondrium, and dislodging the spleen from its usual situation.

The tumours connected with other organs, that are liable to be mistaken for enlargement of the spleen, seem to be the following:—1. Scirrhous thickening of the stomach; 2. Disease of the omentum; 3. Tumours of the liver, particularly an unusual and separate enlargement of its left lobe; 4. Tumours formed in the peritoneum; 5. Tumours seated in the left kidney, or an increase of its size, so that its upper extremity comes to lie behind the ribs; 6. Ovarian dropsy; 7. Accumulation of fæces in the colon; 8. Chronic abscess of the integuments; and, 9. It is alleged, that organic affections of the heart, or an enlarged, and particularly a hepatised, state of the lungs, often push the ribs so much upwards, as to countenance the suspicion of the existence of enlargement of the spleen.

From the proximity to the spleen of so many other parts, as the heart, the lungs, diaphragm, stomach, kidneys, colon, it is very difficult to determine the precise seat of painful sensations experienced in that region. The degree of the pain, when it can be localised in the spleen, will assist the practitioner in judging of the more or less inflammatory character of the affection.

Pulsation in the region of the spleen seems to occur in affections of that organ, both of an acute and of a chronic nature.

Besides the symptoms of tumour and pain in the region of the spleen, its diseases usually give rise to some of the following phenomena, viz. pain and oppression of respiration, sometimes in the form of dyspnœa, and sometimes of asthma; cough, generally dry, but sometimes accompanied with mucous expectoration; occasionally there occurs hiccough in place of cough; various appearances of the blood when drawn from the veins, and the occurrence of several of the symptoms characteristic of scurvy; various peculiarities of gait, such as bending the body to the left side, resting the hands on the region of the spleen, and in walking, stepping out farther with the right than with

the left foot; distress in, or inability of, lying on the right side; depression of spirits, torpor of mind, inactivity of body, with much muscular debility; deadly paleness, or a yellowish hue, tending more to black or green, than in diseases of the liver. Great liability to hæmorrhage from the various regions of the body, to dropsy, to dysentery, and to ulcers of the legs, may be added to the catalogue of morbid phenomena by which diseases of the spleen are attended in their progress, and which influence very materially their ultimate result.

Causes. Certain articles of diet and medicine have been supposed to exert an injurious operation upon the spleen, particularly impure water, spirituous liquors, and, according to some, the employment of bark; but this last supposition does not seem to rest on any very satisfactory evidence. In a large proportion of the cases of inflammatory enlargement of the spleen, which have been recorded, the disease has been the consequence of external injuries, as of blows or falls, on the splenic region. It seems probable that splenic inflammatory affections will be most liable to follow external injury, in those districts of country in which there is a tendency to the spontaneous development of this form of disease.

The production of diseases of the spleen, as of those of the liver, seems, in a considerable number of instances, to be consequent on disease already existing in some other portion of the economy. Their liability to occur in intermittent fevers is well known; but in recent times, pathologists have been much divided as to the relation which subsists between such forms of fever, and the enlarged state of the spleen with which they are so frequently accompanied; a doubt having been raised, whether the splenic enlargement occurs as a consequence of morbid actions taking place during the progress of the fever, or whether the fever occurs as the consequence of a previous change in the condition of the spleen,—whether, in short, this state of the spleen be the essential disease, of which the phenomena of intermittent fever are merely symptomatic, as gastro-enteritis has been supposed by some pathologists to be the essential disease of continued fever. But it is not in fevers which assume an intermittent type only, that the spleen is liable to undergo alterations in its structure. Recent authors on the continued fever, both of France and of this country, have noticed the frequency of morbid apppearances in this organ in fatal cases of that disease.

Authors on diseases of the heart, and on those of the spleen, concur in stating that affections of those two organs very often co-exist; but a discrepancy of opinion subsists, as to which of them should be regarded as the primary disease; whether morbid conditions of the heart induce or favour the production of morbid conditions of the spleen, or the reverse; or whether these two organs may act on each other reciprocally, in this respect.

It has been alleged, that diseases of the lungs also are liable to occur in complication with those of the spleen; but it is unquestionably with the morbid affections of the other abdominal viscera, particularly of the stomach and liver, that the diseases of this organ are most usually combined.

Enlargement of the spleen seems not unfrequently to attend derangement of the menstrual function, or its first appearance, particularly when this is tardy, or its disappearance in the critical period of life.

It is said that there occasionally occurs a metastasis or translation to the spleen, of inflammation seated in some other organ, particularly in gout; and the suppression of natural and of morbid secretions, hæmorrhoids, cutaneous eruptions, ulcers on the feet, &c. have all been regarded as very frequent causes of diseases of the spleen.

Affections of the spleen, and particularly the various forms of its enlargement, are, as has been known from the most ancient times, of much more frequent occurrence in the damp marshy districts both of temperate and hot climates, than in other situations; a great number of the inhabitants of the worst of these districts labouring under these affections. In a large proportion of

such cases, the development of the splenic disease has been cotemporaneous with an attack of intermittent fever; but occasionally it would appear that it occurs as an idiopathic disease, in consequence of the combined operation of various morbific causes.

Treatment. In the remarks which we have to offer on the treatment of diseases of the spleen, it will be sufficient to distinguish them into the acute and the chronic; the latter admitting of a further subdivision into those which admit of cure, and those in which we can only hope to palliate symptoms.

With regard to the acute affections of the spleen, there seems to be nothing in their nature to withdraw them from the ordinary principles of the antiphlogistic treatment as applied to similar affections occurring in other organs. General and local detraction of blood are to be had recourse to in an attack of acute splenitis, whatever may have been its cause, just as they would be in acute inflammation of any other organ. Indeed, their use seems to be the more necessary, in this disease, from the very large proportion of blood which the spleen receives even in its healthy state.

How far the simple enlargements of the spleen admit of being reduced by general or by local bloodletting, is a point on which practitioners seem not well agreed. The use of leeches, however, for that purpose, has been strongly recommended by some, and that of cupping by others.

The benefit to be derived from the employment of purgatives, in chronic enlargements of the spleen, is another point on which medical men have expressed contradictory opinions. To say nothing of their having been approved of by the older physicians, from Hippocrates downwards, we find, in recent times, Dr. Bree esteeming continued daily purgation as an effectual means of cure in this class of affections. Compositions of aloes and antimony were preferred by him, but not exclusively adopted. Large doses of neutral salts appeared exceptionable, when exhibited daily, from their occasioning flatulence and depression. But aloes, extract of colocynth, and scammony, with jalap, acted without this inconvenience; and calomel, combined with these at intervals, seemed to produce more effectual discharges from the bowels: tartarised antimony, in such minute doses as not to induce vomiting, always appeared to increase the beneficial effect of these combinations. It appears, as Dr. Abercrombie has remarked, that, in the chronic state of enlargement of the spleen, the chief reliance of those who have seen most of the disease, is upon free and continued purging, and especially upon purgatives combined with tonics. The spleen powder and spleen mixture of Bengal, are combinations of rhubarb, jalap, scammony, and cream of tartar, with colomba powder and sulphate of iron, taken three times a day, in such doses as to keep up regular but moderate purging. About twenty days are stated by Mr. Twining as the period which is generally required for reducing, by this treatment, a very considerable tumefaction of the spleen, if the case be of recent origin. Others employ nitric acid, with regular aloetic purges. Mr. Henderson speaks very favourably of the combination of acids with purgatives in the treatment of splenic disease, as occurring in India. He alludes to a preparation of aloes and vinegar, generally in the proportion of an ounce of vinegar to twelve grains of aloes, given so as to affect the bowels considerably, as a much-employed and beneficial remedy, but adds that he has himself derived great benefit from the substitution of nitric acid in place of the vinegar. Piorry and Nivet disapprove much of purging in cases of hypertrophy of the spleen; and the latter goes so far as to say, that modern authors have almost completely renounced this practice; a statement which is amply refuted by the authorities to which we have just referred.

The use of mercury was at one time as generally recommended in diseases of the spleen as in those of the liver; but its prejudicial action, in cases of this kind, seems to be now almost universally admitted. This fact was noticed by Dr. Vetch in 1824; but it is to the late Mr. Twining that medicine is indebted

for the fullest exposition of the injurious operation of mercury in diseases of the spleen.

The remedy which is chiefly extolled by recent French writers, in cases of enlargement of the spleen depending on, or connected with, intermittent fever, is bark in its different forms. The observations of M. Caron d'Annecy are said to have demonstrated the almost constant efficacy of powdered bark, in the dose of from two to four drachms, and sometimes continued for two or three months, in the cure of enlargement of the spleen depending on this cause. MM. Bally and Piorry also speak in the highest terms of the efficacy of the sulphate of quinine, in reducing enlargement of the spleen.

Some cases of enlarged spleen have been recorded, in which the action of iodine has appeared to produce very beneficial results. Dr. Bigsby says, that the tuberculated condition of the spleen, which is met with in children, is certainly much under the control of minute and long-continued doses of iodine. But in what manner certainty on this point was attained, he has not explained. He adds, that the iodine should be applied at the same time to the side, in the form of a liniment.

The employment of the actual cautery, in the treatment of enlarged spleen, was very strongly recommended to the notice of the medical profession, by a letter from Mr. Young of Bengal, published in the *Annals of Medicine* for 1801, in which he gives an account of a cure performed, by means of this remedy, upon himself. He states, that the actual cautery is, among the natives of Bengal, so universal a remedy for the enlargement of the spleen, which succeeds to the bilious remitting fever, that few of them are not marked by it. Mr. Henderson speaks of its being common for the natives of Hindostan to resort, in the treatment of splenitis, to ulcers, issues, and cupping; but he considers these remedies as by no means worthy of being relied on.

Percussion, as a remedy in enlargement of the spleen, seems to have been long practised in different parts of the world. It is mentioned with disapprobation by Fabricius ab Aquapendente; but Grottanelli speaks of it as being pursued with success in Italy, at the present day. Dr. Chisholm has mentioned the case of a gentleman in Grenada, whose spleen had undergone great enlargement in consequence of repeated attacks of remittent fever, but who derived much benefit from pressure, or kneading. As a means of relief applicable to all the species of enlarged spleen, M. Nivet very properly mentions compression of the abdomen, effected by means of a large body bandage, supported with straps passing below the thighs and buttocks. It presents the advantage of supporting a part of the weight of the spleen during exercise, in the way of walking and riding, which are highly useful to persons affected with spleen disease; it diminishes the stagnation of the blood in the spleen, and facilitates the resolution of its congestions.

DISEASES OF THE URINARY ORGANS.

In treating of diseases of the urinary organs, with reference to the precise object of the present work, it will be necessary to confine the attention to such diseases as come properly under the cognizance of the physician. With this view the whole subject of diseases of the kidneys will be considered in its details. Diseases of the bladder will then be investigated; under which branch, however, there are scarcely any topics but what may be touched on slightly, since they are connected rather with the practice of surgery than with the practice of physic. The diseases of the urethra and neighbouring parts, which belong entirely to the domain of the surgeon, will be regarded only in so far as they are concerned in the diagnosis of diseases of the bladder or kidneys.

PROPERTIES OF HEALTHY URINE.

Average daily quantity. — Chemical constitution — Density.

Before entering on any part of this inquiry, a few remarks will be required upon the healthy constitution of the fluid, whose secretion and discharge the kidneys, the bladder, and their adjuncts are mainly intended to accomplish. It is scarcely possible to take a single step with confidence in the diagnosis or treatment of diseases of the urinary organs, without attentively studying the deranged states of the urine; and in order to appreciate correctly the inferences to be founded upon these states, it is indispensable that a correct knowledge be formed of its healthy condition. Nor can the reader be safely left here to gather the requisite information from physiological authors, as might naturally be presumed; for, in many treatises on physiology, some points of considerable practical importance have been either overlooked, or are involved in doubt and contradiction.

Healthy urine presents many characteristic properties, which on the whole are uniform in kind, but very variable in degree. Taking for the most healthy and perfect example of urine, that of a robust man between adult and middle age, of active habits, and observing a diet moderately dry, little or not at all alcoholic, and with a full proportion of animal aliment, it will be found, at least in a majority of instances, that the average daily quantity of urine is about thirty-five ounces fluid, the average density about 1029, the average solid contents about six and two-thirds per cent., and the average daily discharge of solids not quite two ounces and a half avoirdupois. Such urine is always of a lively wine-yellow colour, transparent and limpid when newly passed, of a strong, aromatic, almost violaceous odour when warm, which becomes disagreeable and peculiar on cooling, of an intense, peculiar, bitter, saline taste, slightly acid in its action on vegetable colours, apt to become somewhat turbid when cold, and alkaline and ammoniacal when long kept. It is composed of water, urea, lithic acid in union with ammonia, free carbonic acid, alkaline sulphates, phosphates, hydrochlorates, and lactates, phosphates of lime and magnesia, colouring or extractive matter, and sometimes a trace of silica and fluoride of calcium, with floating vesical mucus. The relative proportions of these numerous ingredients probably vary to a great extent; but the only positive information yet possessed on the subject is that derived from the solitary analysis of Berzelius made thirty years ago, according to which 1000 parts of healthy urine, containing 67 of solid matter, are composed of 30 urea, about 17 of lactates and colouring matter, $4\frac{1}{2}$ chloride of sodium, nearly 4 of sulphate of potash, about 3 of sulphate of soda, nearly the same of phosphate of soda, $1\frac{1}{2}$ phosphate of ammonia, as much hydrochlorate of ammonia, 1 of the phosphates of magnesia and lime together, and 1 of lithic acid. The si-

lica and fluoride of calcium admitted as ingredients by some physiologists are not always present, and are probably accidental. Assuming this analysis to represent the composition of healthy urine, it follows that there is daily discharged by the kidneys 1090 grains, or nearly two ounces and a half avoirdupois of solid matter, of which 510 grains, or exactly one ounce and a sixth, consist of urea.

The accuracy of this view of the properties of healthy urine will be called in question by many. Parallel statements at least have been questioned of late; and a very different account has been given of the healthy constitution of this fluid. It would be improper to discuss fully the merits of the question in the present place, more especially as facts are still wanting to justify a confident conclusion. But some allusion to it is nevertheless indispensable; because much of what will be brought forward afterwards, relative to the pathology and treatment of urinary diseases, must necessarily bear a reference to some assumed standard for the properties of the urine.

By some chemists, then, the density of healthy urine has been stated so low as 1010 (*Thomson*). Others, preferring to state a general average, represent this to vary between 1010 and 1015 (*Prout*), — or at 1015 for adults, and 1010 inclusive of children (*Willis*),—or between 1012 and 1017 (*Venables*), — or at 1016 (*Macgregor*), — or so high as 1025 (*James Gregory*, secundus). Few admit that the description and analysis of Berzelius are applicable to healthy urine. Many authors on this subject, however, appear to have taken an erroneous method of arriving at accurate and practically useful results. The determination of the characters of average healthy urine in the gross is almost impossible, and at all events of little value in physiology, and of no importance in relation to medical practice. The proper object of inquiry is the average in various circumstances of health; and the inquiry must set out from the average in circumstances of perfect physical development, and the most perfect discharge of every bodily function. Such seems to have been the case held in view by Berzelius in his analysis; and such is the case supposed in the sketch given at the outset of this exposition. Every observation yet made by the writer tends to show, that if the conditions there specified be attended to, the description which has been adopted will be found to apply very nearly. But it is not meant to be alleged, and no accurate inquirer will maintain, that such urine is the only kind of healthy urine. On the contrary, very great deviations may take place from the perfect standard assumed above, and yet without being incompatible with the full enjoyment of health. The density of urine and the proportion of its solids are apt to be increased by hot weather, by much exercise, especially if it excite free perspiration, by a very dry diet, by a highly animal diet, by particular articles of food, such as cheese and other highly azotized substances, by the digestion of particular meals, especially that of dinner, and by obscure constitutional causes. On the contrary, it is diminished by cold weather, by a sedentary occupation, by a watery diet, by too much vegetable food, by certain articles of food, and still more of drink, especially acids and alcoholic fluids, by certain meals, such as breakfast, and by unknown constitutional circumstances. Further, the density of urine is low in childhood, higher in youth, highest in manhood, and generally lower again in old age. It is lower in females than in males. It is at its average in the morning on awaking, provided no disturbing cause had come into action the previous evening; it falls considerably after breakfast; it rises again gradually after midday; it sinks again immediately after dinner, but in a few hours rises higher than at any other time; and in the course of the night it gradually returns towards its average. When several influencing causes concur, the deviations that ensue are excessive; so that the extremes for healthy urine were correctly placed first by *Cruikshank* and afterwards by *Dr. Gregory* at 1005 and 1033. Unless all the causes are taken into consideration, it is impossible to arrive at a knowledge of the true average density of healthy urine.

Authors, however, have seldom mentioned whether they took them into ac-

count or not; and therefore most of the late statements on the subject are little entitled to credit. Of all the inquiries yet made, that of *Dr. Gregory* has appeared to the writer the most worthy of confidence; for, besides having been conducted on a great scale, they were entered upon, as the writer happens to know, with a due knowledge of disturbing causes. According to *Dr. Gregory*, the extremes for adult and middle age are 1005 and 1033, the greatest range for the same individual 21 degrees, the ordinary range between 1016 and 1031, and the mean of 363 experiments on fifty individuals 1022·5. It is probable that this average is rather low than high, because the writer knows that many of the experiments were made soon after breakfast, and comparatively few after dinner. And, accordingly, the average for five individuals, whose urine was tried between twenty and fifty times each, was 1025·2. This last number will probably indicate the average density for manhood in the middle station of life, where it is the common practice to take much more food, and especially a greater proportion of animal food, than is absolutely required.* It is much to be desired, however, that in any future inquiries which may be undertaken on this subject, observers would not confine themselves, as all have done hitherto, including even *Dr. Gregory*, to one single general average; but that, proceeding from the average in what has been assumed above as the condition for the most perfect secretion of urine, they would endeavour to ascertain the averages for all the most important circumstances formerly alluded to, which are not incompatible with its healthy state.*

Variations in the density of urine are usually compensated in a state of health by variations in its quantity; the general result of which is that in different individuals, situated alike as to food and exercise, the amount of solids discharged daily with the urine is pretty nearly the same. There are undoubtedly many exceptions, depending chiefly on constitutional causes. But it will be found on the whole, that where the food and exercise are nearly the same, the urine if low in density is above the average in quantity, and *vice versâ*; and that a pretty exact compensation is thus established. The average range of the daily quantity is probably between thirty and fifty ounces avoirdupois; but there are few observations on this head. According to *Rayer* the extremes in health are twenty-one and fifty-seven ounces. Equally meagre is the information procured of the average discharge of solids in various given circumstances. This however is one of the most important conditions to be determined with a view to the diagnosis and treatment of urinary diseases. A knowledge of the density and quantity indeed is chiefly serviceable, at least in many circumstances, as leading easily to a knowledge of the daily discharge of solids. It has been already mentioned that in the most favourable conditions for health, physical development, and the perfect discharge of the functions, the solids discharged amount to nearly two ounces and a half avoirdupois; and the quantity probably falls seldom short of one ounce and a half, unless in individuals of small frame, or those who live sparingly and take little exercise. When the quantity of food

* It would be no difficult matter to form a probable conjecture as to the fallacies which have led some late authors to fix the density of healthy urine so low as 1015, 1012, or even 1010. But the question, if it is still to be considered open, must be settled by fresh facts, not by conjectures and inferential suppositions, such as have been indulged in too much, perhaps, by some of the authors alluded to. As an example of the looseness of this method of inquiry, it may be well to refer shortly here to the late learned and generally exact work of *Dr. Willis*. Objecting to the statements of Berzelius, and of the writer (*Edin. Med. and Surg. Journ.* 1829), that healthy urine has a density of 1029, *Dr. Willis* insists that the urine examined must have been unusually high in density, and probably the highest of the day; because, otherwise, the quantity discharged, amounting in the latter case to thirty-five ounces, would imply, according to *Chossat's* researches into the ratio subsisting between the aliment and the solids of the urine, that the solid food taken in twenty-four hours amounted to the enormous sum of eighty ounces, or at least thrice the common average. The source of fallacy in this reasoning is not far removed from observation; but the fact is a better answer. The writer's experiments were made with the average urine of the total quantity passed in seven continuous days, at the end of September, in the case of a healthy robust male of the middle ranks, in his thirtieth year, accustomed to active exercise, and observing the usual diet of his station and age, that is, consuming between twenty-four and thirty ounces of solid food daily, rather sparing in the use of liquids, and abstaining for the time from wine and stronger alcoholic fluids.

exceeds what is requisite for supplying the growth and waste of the body, the discharge of solids is always increased; and it is probable that a small excess of food is sufficient to render the increase considerable.

An increase in the quantity of urine, with a decrease of its density, infers a diminution in all its sensible properties; and it is not so liable to become turbid on cooling. The relation of its ingredients to one another may not however be altered; but this will depend upon the cause of dilution. Accurate researches are still wanted as to the effect of various causes of dilution on the relative proportion of the solid contents of the urine. One important fact has been determined chiefly by the interesting researches of *Magendie*,—namely, that vegetable food, which increases the quantity of the urine, diminishes greatly the proportion as well as quantity of lithic acid in it, and probably also of its urea. A decrease in the quantity of the urine, with an elevation of its density, has precisely the opposite effects with those just related; and an animal diet acts conversely to a vegetable diet upon the quantity and proportion of lithic acid and urea. A vegetable diet diminishes, and an animal diet increases, the proportion of urea and lithic acid, even beyond their mere effect in increasing or diminishing the quantity of the urine, or its density. Particular articles of vegetable or animal food have in all probability remarkable effects of the same nature; but it is greatly to be lamented, for the interests of medical science and practice, that this department of inquiry has been little cultivated. Among the articles which increase the proportion of lithic acid none are more efficacious than pastry, and above all cheese.* It should be remembered that the proportion of lithic acid in the urine may be much increased, without the urine being visibly affected, so long as it is quite fresh and warm. In fact, healthy urine of the density 1029 may be made to dissolve a considerable quantity of lithate of ammonia by agitation at 100° F., and still more by ebullition. But it parts with the excess on cooling, and then becomes very turbid; and if the cooling take place slowly, a gritty or semicrystalline deposit of lithate of ammonia is formed. When lithic acid exists in unusual abundance in healthy urine, it is always present, as indeed is probably the case in every circumstance, under the form of lithate of ammonia. After a deposition has taken place on cooling, an excess is often still retained in solution. This will be discovered by nitric acid, which, appropriating the ammonia, separates the lithic acid in the form of a cloudiness or flaky precipitate. Healthy urine possesses the property of dissolving a considerable excess of one of its earthy ingredients, the phosphate of ammonia and magnesia. It admits of doubt, whether such excess ever occurs to any material extent in the healthy state of the secretion; but when present, it is discovered by the action of heat followed by nitric acid; for ebullition continued for a few seconds separates a flaky white precipitate, which a drop or two of the acid speedily redissolves. The separation of the precipitate, under the action of heat, is probably owing to the disengagement of carbonic acid, by which the ammoniaco-magnesian phosphate is kept in solution.

DISEASES OF THE KIDNEYS.

The diseases to which the kidney is liable are some of them functional, others organic. The functional diseases which have been chiefly admitted into nosographical works are gravel and calculus, diabetes, hæmaturia, and suppression of urine. The organic diseases have been hitherto little studied. The only frequent organic disease is granular degeneration; and the others which

* According to *Rayer* and *Guibourt*, the urine of infants at the breast is almost destitute of urea, and the proportion of this principle to the other ingredients gradually increases towards manhood.

have been chiefly noticed are nephritis or inflammation; tubercles; urinary and serous cysts; malignant diseases of the nature of cancer, fungus and cerebriform deposition; melanosis, cartilaginous and osseous degeneration, congestion or hyperemia, and atrophy, most of which disorders are interesting chiefly as anatomical derangements,—their symptoms and treatment being little known.

FUNCTIONAL DISEASES OF THE KIDNEYS.

Morbid states of the urine. — Variations in the density and solid ingredients. — Sensible qualities. — Urea. — Lithic acid. — Earthy phosphates. — Impregnation with blood. — Albumen. — Sugar. — Bile. — Milk. — Oleo-albuminous matter. — Oleaginous or fatty matter. — Pus. — Spermatic fluid. — Carbonate of ammonia. — Nitric acid. — Oxalate of lime. — Carbonate of lime. — Melanic acid. — Cystic oxide. — Siliceous deposits. — Hydrocyanic and ferrocyanic acids. — Phosphorus.

The urine as described in the preceding pages is subject to important modifications, the result of morbid action, either primarily excited in the kidneys themselves, or induced secondarily by diseases in other organs of the body. There is scarcely any end to the variety of morbid states which may thus be occasioned; but the most remarkable of them are the following.

Sometimes the quantity of the urine is greatly increased, occasionally to forty or fifty pints a day; and this without its constitution being changed. Sometimes, on the other hand, its quantity is much reduced; or it is even entirely suppressed. The density is often preternaturally great, reaching occasionally to 1055 or perhaps even higher. Frequently too it is excessively low, and in some cases has been observed at 1001, or even almost as low as that of water. The daily discharge of solids is often unusually great, and has been known to reach so high as thirty-six ounces avoirdupois; while on the contrary it is often very small, so scanty at times as only eleven grains.

It is often so loaded with its ordinary constituents as to deposit a copious sediment on cooling. Sometimes, owing to a superabundance of one or more of them, it is muddy even when first passed. Its colour is often altered to blood red, cherry red, brown, or orange. Its odour is sometimes ammoniacal from the first moment it is passed, or becomes so in an hour or two; or it is feeble; or like that of honey; or modified in a variety of ways by particular articles of food and drink. Its taste is also often altered, being sometimes unusually alkaline, or preternaturally saline, or feeble though otherwise natural, or distinctly sweet. Its action on the vegetable colours is also often altered; instead of rendering litmus paper red, it turns reddened litmus purple, which is owing to the presence of an excess of ammonia in the form of carbonate.

Of its ordinary ingredients the *Urea* is perhaps most frequently affected in quantity. Sometimes it appears nearly or altogether wanting; sometimes twice or thrice the average for the most perfect urine is passed daily, in which case the density is usually very high, namely 1032 or even more, and the proportion of urea is so great that in cool weather nitric acid will cause crystallisation of nitrate of urea without the fluid being concentrated. — The *Lithic acid* is also very often altered in quantity. Sometimes it is nearly wanting; but a much more important condition is superabundance of this principle, in which case the urine either forms an excessive deposit on cooling, or yields a muddiness or precipitate with a few drops of nitric acid, or contains gritty particles, or even small calculous concretions of lithic acid and lithate of ammonia, at the moment of being passed. Lithic acid exists less frequently in the free state in urinary deposits than in a state of combination with ammonia. When free, the deposit does not necessarily depend on the lithic acid being present to excess in the urine; for it may be simply occasioned by an excess of a stronger acid, such as the muriatic or phosphoric, disengaging the lithic acid from its natural state of

combination with ammonia. The uncombined lithic acid tends to the crystalline form. It is known by being insoluble in muriatic acid, sparingly soluble in solutions of the alkaline carbonates, easily soluble in solution of potash, without evolving ammonia, and convertible by heat and nitric acid into a solution which leaves a red residuum when evaporated, and then forms a purple solution with ammonia. It is seldom all uncombined however in lithic deposits, being usually either in part or altogether united with ammonia. Deposits of this nature are generally amorphous, seldom crystalline, and present the same chemical properties with uncombined lithic acid, except that they dissolve readily in solutions of alkaline carbonates, give off ammonia when dissolved in solution of potash, and are more soluble in water. — The *Earthy Phosphates* are more rarely increased in amount. Sometimes they abound so much as to render the urine milky when passed; more frequently they render it opalescent, and afterwards form a scanty white sediment after a few hours of rest; occasionally they do not separate for a few hours, the urine being previously clear, in which case it is commonly observed that this fluid becomes in the first place ammoniacal; occasionally too they do not separate for a long time, but may be detected in the form of a white flaky precipitate by boiling the urine. The deposit in all these cases consists very rarely of phosphate of lime only, often of the phosphate of magnesia and ammonia, frequently of both together. In certain circumstances the earthy matter is discharged not in the form of an impalpable sediment, but in that of a gritty powder, or in calculous masses of appreciable magnitude. The phosphates are known by being soluble in acetic acid and in muriatic acid, but insoluble in aqua potassæ. If ammonia is disengaged by the potash, the ammoniaco-magnesian phosphate may be presumed to be present. If the solution in acetic acid precipitates with oxalate of ammonia, phosphate of lime is present. If, after the addition of oxalate of ammonia, a precipitate be occasioned by ammonia, the ammoniaco-magnesian phosphate is present. If both re-agents occasion a precipitate, the sediment contains both phosphates. A mixture of the two is remarkably fusible before the blow-pipe flame. — Another natural ingredient which sometimes abounds in the urine, is *Mucus*. When very abundant, the urine is always alkaline and ammoniacal; and its condition then commonly depends on organic disease in the kidneys or bladder. Mucus, in only moderate excess, sometimes remains in a state of solution or invisible suspension in the urine; but it may then be detected by the urine being ropy, remaining unaltered by boiling, and becoming cloudy when treated with a few drops of acetic acid. At other times mucus puts on the ordinary characters of that principle, and after a short period of rest is found adhering firmly to the vessel in the form of a glairy ropy mass. In other circumstances again, a substance, which has been considered mucus somewhat altered in character, exists in the form of a very fine powder, which communicates to the urine a peculiar opalescent appearance, is slowly and only in part deposited under long repose, disappears under the action of alkalis, and becomes more distinctly flocculent or powdery under the action of heat or acids. By some these particles have been considered to be the scales which form the surface of the mucous epithelion of the bladder.—The inorganic acids contained in the urine, especially the *Muriatic* and *Phosphoric acids*, are sometimes increased in quantity. They do not however exist in the free state, but decompose the salts of the weaker acids, namely the lactic and lithic acids, thus giving rise to lithic deposits. It has been already mentioned, that uncombined lithic acid is sometimes separated in the form of crystalline deposits from the action of muriatic acid or phosphoric acid in excess upon the lithate of ammonia, although that salt be not superabundant.

The urine is also liable to various morbid impregnations, which it never presents in the healthy state. Some of these are soluble others insoluble, and therefore sedimentary. A common impregnation is with *Blood*. This may be either so small in quantity as to communicate a smoke-brown or

cherry-red tint, without separating at all under rest, or may be so abundant as to be also detached at once in the form of a sanguinolent deposit, which is sometimes even coagulated, or may almost entirely take the place of the urine, so that the discharge, on standing a little, becomes one uniform mass of loosely coagulated blood. In the first of these cases, blood may be known by ebullition occasioning a dirty greyish brown flocculent precipitate, and at the same time removing the adventitious colour. Another frequent impregnation is *serum*, or more correctly speaking, *Albumen.* It is possible that the presence of a small proportion of albumen is sometimes consistent with the healthy state of the secretion,—scarcely however if the impregnation is habitual. When scanty, it is detected by the action of heat and the mineral acids; being separated in the form of a fleecy powder when the urine is heated near to its boiling point, and remaining undissolved on the subsequent addition of nitric acid. The last character is requisite in order to distinguish this principle from an excess of earthy phosphates, as these are easily separated by heat in the form of flakes. Albumen, when present, varies greatly in its proportion; being often less than one part in 1000, and at times so great as twenty-seven parts; in which case the urine is observed to form a uniform and pretty firm jelly on being heated. A remarkable ingredient of one variety of urine is *Sugar.* This principle usually renders the secretion superabundant and often excessively so, sweet to the taste, of high density, and fermentable with yeast. Its proportion and quantity vary very much. In a case not long ago under the writer's care towards thirty ounces of sugar must have been discharged daily for several days together. According to *Dr. Prout* a moderate impregnation with sugar is sometimes met with in old dyspeptics or gouty people, without occasioning diuresis or any serious illness; and this statement is confirmed in some measure by *Dr. Venables.* But much more generally sugar in the urine is associated with great increase of its quantity, and with fatal constitutional derangement. *Bile*, or at least the colouring matter of the bile, is present in the urine of certain diseases, and communicates to it an amber or gamboge tint, the true cause of which is known by nitric acid rendering it green, and by white linen being stained by it yellow. *Milk* is a very rare and doubtful ingredient of morbid urine. It may be detected by its bluish white colour, the presence of milk-globules when it is examined by the microscope, the effect of acetic acid in coagulating it, and the want of any similar effect from heat. There can be no question that the greater part of the recorded cases of milky urine have been cases of deception. In an instance of the kind, at one time under the writer's care, the patient, a female, was thought to pass milky urine, and some believed her tale, though she occasionally had the impudence to produce pure milk as the discharge from her bladder. She was in the end clearly proved to be an impostor; but it was on several occasions impossible for days together to discover where she got the milk to carry on the deception. There is another morbid impregnation, however, which has been often mistaken for milk, and which is of rather more common occurrence, though still rare, namely an *Oleo-albuminous* matter, probably analogous to that which occasions the remarkable milky appearance at times observed in the serum of the blood. The urine in such cases resembles milk in colour and consistence. It is commonly acid and decomposes more readily than natural urine. On standing for a little it sometimes continues homogeneous; at other times it coagulates into a mass like blanc-mange, which gradually separates into an opaline fluid and a fibrinous matter apparently differing little from perfect fibrin; and at other times again it either deposits or throws up a stratum of thick cream-like matter. The coagulum, deposit, and cream present characters varying between those of fibrin and albumen, but contain also some oily or fatty matter removable by sulphuric ether. The fluid part is usually coagulable by heat, always coagulable by acids, and when acidulated with acetic acid yields a precipitate to ferrocyanide of potassium, — which last property seems to associate the coagulable principle rather with fibrin than with albumen. This singular variety of urine

has been termed by *Prout*, who first accurately described it, "chylous urine," and is considered by him to owe its peculiar characters to chyle passing into the blood without undergoing further elaboration, and being discharged, like other foreign matters in the circulation, by the kidneys. A simple *Oleaginous* or *fatty* matter has been occasionally found in the urine, forming a pellicle or scum on it a short time after it is passed. This has been supposed to arise from steatomatous tumours adhering to the inside of the bladder. More generally it is a fallacious appearance, and in hospitals, particularly, is owing to oil having inadvertently been kept in the vessel used to receive or preserve the urine. Another of the rarer morbid ingredients of the urine is *Pus.* This is often distinguishable by its yellowish or greenish-yellow colour, and the rapidity with which it sinks and arranges itself in a distinct substratum. But sometimes it is unusually white, and may then be confounded with other urinary deposits. It may be known in such cases by being easily diffusible, but not soluble in the urine; by resisting the action of acids; by becoming a flocculent mass when heated; and, in doubtful cases, by the size and form of its globules, which are spherical, somewhat granular, and twice the diameter of the blood-globules. It is also said that pus yields oily matter to ether, which mucus does not. The *Spermatic fluid* is said to be sometimes met with in the urine. There is however no good practical method of recognising it, although a test of this kind would be obviously desirable in certain cases. *Carbonate of ammonia* is not an uncommon ingredient. It is derived from the urea, which in certain diseased states appears to be secreted with its properties imperfect, and, among the rest, more prone to decomposition. It may be often remarked by the ammoniacal odour of the urine, after standing for a few hours; but sometimes the same test will detect it in what is quite fresh and newly passed. Whenever the odour of urine is ammoniacal, an acid disengages a large quantity of carbonic acid. This condition of the urine is almost universal when the earthy phosphates abound as a sediment. *Nitric acid* is said to be an occasional ingredient of urine, having been apparently met with in some forms of inflammatory fever, and also, according to Dr. Prout, in some purple deposits. One of the most interesting morbid ingredients of the urine is *Oxalate of lime.* This constitutes the material of certain forms of gravel, and more frequently of certain calculi. Chemists and physiologists were long at a loss to account for its presence upon chemical grounds; but the difficulty is removed, since Liebig and Wöhler lately proved that oxalic acid is formed from urea by the action of certain oxidating agents, such as peroxide of lead. It always exists in the form of a deposit or concretion. Some have supposed that free oxalic acid may at the same time be occasionally present, but this has never been proved except where the acid was swallowed, which Krimer showed may pass out unchanged with the urine. Oxalate of lime is known by being insoluble in aqua potassæ, insoluble in acetic acid, soluble in nitric acid, and convertible at a red heat into carbonate of lime. *Carbonate of lime* is a rare ingredient of urinary deposits. It is to be detected by dissolving with effervescence in muriatic acid, and forming a solution which is precipitated by oxalic acid in excess. A considerable variety of *Coloured sediments* have been observed. A rare variety is the *Black sediment*, first carefully examined by Dr. Marcet, and traced by him to a particular acid which he has named melanic acid. The *Blue sediment*, also very rare, is probably owing to the same principle. The *Red* and *Purplish* sediments are more frequent, indeed far from uncommon, and have been referred partly by Dr. Prout to the alkaline purpurates, produced by nitric acid converting the lithic into the erythric or purpuric acid, and partly by Vogel, Berzelius, and others, to peculiar animal colouring matters. They are commonly associated with an excess and deposition of lithate of ammonia. They are often observed when inflammatory action is present, and seldom in any other circumstances. Among the rarer sedimentary matters may be reckoned the *Cystic oxide* of Wollaston, or cystine of later authors. It is probably not so rare as has been hitherto thought, because till of late the attention of practitioners has been chiefly confined to this principle as existing

in the form of calculi. It has been recently met with by *Dr. Prout*, *Dr. Venables*, and *Dr. Willis*, in the form of fine impalpable powder, sometimes constituting a deposit, sometimes a scum on the surface, sometimes a floating cloudiness. It may be suspected to exist, where the urine is greenish yellow, muddy, and of a mixed odour of fetid urine and the sweet briar. But the true nature of the deposit is to be determined by its being soluble in diluted muriatic acid, insoluble in tartaric, acetic, or citric acid, soluble in aqua potassæ, precipitable from this solution by solution of bicarbonate of ammonia, and by its emitting a very peculiar odour when heated. Sometimes the urine presents small *Prostatic calculi* derived from the prostate gland. These have a considerable resemblance to lithic concretions. They are usually yellowish, sometimes earthy and friable, sometimes firm, compact, and polished. They may be known by their appearance, by their being homogeneous, not in concentric layers, and by their containing no other phosphate except that of lime, which very rarely exists alone in true urinary calculi and deposits. *Siliceous deposits* are enumerated by most authors among the morbid ingredients of the urine. There is hitherto, however, no satisfactory evidence that silica forms a material part of any urinary sediment. It will be mentioned afterwards, under the head of Gravel, that almost every instance of siliceous gravel that has come under the observation of recent authors, has proved to be a case of imposition. *Hydrocyanic* and *ferrocyanic* acids have been found in one or two instances in the urine; and a few observations have been made of luminous urine, which was supposed to owe this property to *Phosphorus*. But these ingredients are merely subjects of curiosity.

The urine, besides containing a morbid proportion of its healthy ingredients, and various morbid ingredients derived from the animal system itself, may also be impregnated with a great variety of materials derived from without, and generally through the medium of the food and drink. It would be out of place to investigate this department of the subject in detail. Those facts alone are here of importance which may affect the diagnosis of urinary diseases. It will be sufficient, therefore, to mention that asparagus imparts to the urine, as every one knows, a peculiar fetid odour allied to that of gangrene; that rhubarb, madder, beet-root, syrup of corn-poppy, cherries, mulberries, logwood, and probably other coloured vegetable substances, communicate a cherry-red colour, like the tint of sanguinolent urine; from which, however, these coloured urines may be distinguished by retaining their hue under ebullition, and that occasioned by rhubarb by muriatic acid rendering it yellow.

Among the many morbid or preternatural contents of the urine, it is particularly worthy of remark, that all those which are organic in their nature have an intimate relation to one another, as well as to the natural constituents of the urine, urea and lithic acid, in their elementary constitution. Urea, lithic acid, oxalic acid, albumen, sugar, cystic oxide, carbonate of ammonia, are so related in their atomic constitution, that simple changes will convert them into one another. Hence the facility, otherwise incomprehensible, with which the urine furnishes so great a variety of morbid products.

Of the numberless morbid affections of the urine now enumerated, and arising from functional disturbance of the kidneys, some are obviously occasioned by disease of the kidneys themselves, as the primary morbid condition. Others are well ascertained to be entirely secondary, and dependent on the concurrence and pre-existence of disease in other organs of the body; in which case the condition of the urine is merely symptomatic. And further, among the conditions which depend primarily on disease of the kidneys, some are connected as frequently with organic as with functional disorders in that organ. Authors, in treating of urinary diseases, or of the morbid states of the urine, have not always attended to these distinctions. Nor in the present state of pathology, as applied to the kidney, would it be either easy or practically useful to observe them. A considerable number of the morbid affections of the urine may be passed without notice in the subsequent details, because they are merely symptomatic of diseases not renal, and occasion no annoyance to the patient.

It will be sufficient to make mention of those affections, which are either connected with primary functional disturbance of the kidneys, or though secondary to other diseases, become of primary consequence through the local disturbance which is excited. These are chiefly gravel and calculus, diabetes insipidus, diabetes mellitus, hæmaturia, albuminous secretion, and suppression.

CALCULOUS DISEASES

It has been mentioned that the urine in many circumstances deposits as it cools a large quantity of insoluble matter, which is commonly loose and pulverulent, but sometimes concrete, sandy, and obscurely crystalline. This state of matters may exist without occasioning any annoyance. But when the insoluble matter is passed along with the urine, and is found in it while still warm in the form of fine powder, sandy particles, or little stony masses, symptoms more or less severe arise, and the disease named *Gravel* is constituted. When the hard masses attain a moderate size, and are retained for some time or permanently in the kidneys, bladder, or urinary passages, the disease is termed *Calculus* or *Stone*. Both, but especially the former, are disorders of frequent occurrence.

GRAVEL

Definition. — Symptoms, general and local. — Condition of the urine. — Varieties of gravel, and their comparative frequency. — Causes and pathology. — Prognosis. — Treatment.

Gravel may be defined, *the discharge of pulverulent or gritty matter with the urine, occasioning symptoms of irritation in the kidneys, bladder, and urethra.*

The matter discharged varies very much in its characters; being sometimes an impalpable powder, sometimes a collection of gritty particles like sand, sometimes formed in part of small calculi of appreciable magnitude. Its composition is also exceedingly diversified. The most frequent species of gravel is lithate of ammonia, with or without free lithic acid, or pure lithic acid; next to this, in point of frequency, is the ammoniaco-magnesian phosphate, or rather a mixture of this with phosphate of lime; next comes the oxalate of lime; a common kind of gravel is composed of several sorts, such as the earthy phosphates with lithate of ammonia, or the latter with oxalate of lime; pure phosphate of lime is rare, as also carbonate of lime and cystic oxide; and siliceous gravel is of doubtful occurrence.

Symptoms. The symptoms of gravel are partly local and partly general. Some of them are common to all kinds of gravel, others are peculiar to certain varieties. The simplest method of discussing the subject will be to treat first of the symptoms of the most common variety, where the insoluble matter is the lithate of ammonia or lithic acid, and then to specify any modifications which may arise in other circumstances.

The symptoms of a general nature, or not referrible directly to the renal organs, are such as indicate disorder of the function of digestion, and disturbance of the circulation. These, however, are sometimes not present at all, and the sufferings of the patient are entirely confined to the organs connected with the secretion and discharge of urine. The usual symptoms of indigestion which occur are acidity of the stomach after meals, sense of weight in the epigastrium, eructation of the food, defective appetite after a time, constipation, a loaded tongue, headach and giddiness, drowsiness, lassitude, and oppression. The ordinary state of the circulation is one of excitement, occasioning frequency and fulness of the pulse, pulsation in the head, some flushing of the features and suffusion of the eyes, with heat of skin, restlessness and general wretched-

ness, especially at night. The local symptoms are dull pain and feeling of weight in the loins, with occasional darting pains there, increased at times by jolting or other sudden movements of the body, but not by mere action of the neighbouring muscles, or by pressure unless made heavily; occasionally acute and at times overpowering deep-seated pain, midway between the loins and pubes, or where this is intersected by a line from the umbilicus to the crest of the ileum, accompanied frequently with tenderness over a corresponding circumscribed spot upon the abdomen; wandering pains behind the pubes, heat and irritation at the neck of the bladder, and itching and pain at the termination of the urethra; pain and often also retraction of one or both testicles, the occasional discharge of blood-red urine, or of little bloody clots, or even considerable hæmorrhage; the appearance in the urine, even when newly passed and still warm, of sandy powder, obscurely crystalline grains, or little calculi, commonly of a greyish or reddish-brown colour, but sometimes white or dark brown, and occasionally in distinct but irregularly formed crystals; frequent calls to pass urine, often preceded by a paroxysm of pain; difficult micturition, occasionally interrupted; often severe sickness accompanying the fits of pain, with depression and anxiety. Most of these symptoms are connected with the presence of depositions in the kidneys or with their passage generally; but the acute fits of pain between the region of the kidneys and the bottom of the pelvis arise from a calculus being arrested in its course down the ureters. The patient's sufferings are always very apt to be increased by brisk exercise, especially however by all brisk agitation of the body, such as running, leaping, and riding on horseback. They are also commonly increased by high living. On the contrary, rest and abstinence, or plain living, relieve them. It is an interesting fact, that the general and even also the local symptoms are for the most part least troublesome, and the patient enjoys the best health, when lithic acid is abundantly deposited from the urine; and sometimes a profuse discharge of gravelly deposit puts an end for a time to long previous suffering.

The urine in the ordinary run of cases is rather scanty, high-coloured, high in density, so as often to reach 1030 or even 1033, and abounding both in urea and in lithate of ammonia, the acid of which is shown to be in excess by nitric acid occasioning a cloudiness and flaky precipitate. A high density, however, with abundance of solids, is not essential to the development even of the ordinary forms of gravel; it is sufficient that the lithic acid be superabundant. In other forms of gravel, the density is even under the general average. The urine, further, in the great majority of cases, is somewhat acid in its action on vegetable colours, of a strong, pure, characteristic urinary odour, and much disposed to become turbid on cooling. In a few cases it is worthy of remark, that the symptoms of gravel occur, though in a minor degree, where the urine furnishes a copious concrete sediment on cooling, even although no insoluble matter be passed along with it, and where the history of the case, in other respects, does not favour the presumption of concretions being present in any part of the urinary organs.

Such are the leading symptoms in the most familiar varieties of gravel; namely, the *lithic gravel*, or that composed of lithic acid and lithate of ammonia. This is by far the most frequent form of the disease, so that, indeed, one may practise long and extensively without meeting with any other. Next in point of frequency perhaps is the *phosphatic gravel*, where the deposit consists of phosphate of lime or the phosphate of magnesia and ammonia, or of both compounds intermingled; and the only other variety, common enough to be of serious practical importance, is the *oxalic gravel*, composed of the oxalate of lime, which in some districts seems more common than the phosphatic species. In oxalic gravel there is usually less constitutional derangement, either in the form of fever or indigestion, before the local symptoms first show themselves; the fit of gravel, as it is called in common speech, comes on for the most part without the attention having been previously drawn to any unnatural condition of the urine; and when the urine is at last examined it is

found to be tolerably clear when passed, and not to yield much sediment on cooling. The constitutional derangement however, such as it is, puts on at first the phlogistic character as in lithic gravel. When the oxalic diathesis has been some time present, according to *Dr. Prout*, the constitution soon suffers more materially: there is a tendency to nervous depression and irritability, irregular action of the heart, flatulence, and cutaneous eruptions of the scaly and impetiginous kinds. The oxalic diathesis seldom exists long without leading to the substitution of the lithic diathesis. A phosphatic deposit in the urine is a common enough occurrence, when the fluid has stood some time so as to become ammoniacal. It is even far from being rare as a formation at the moment of the discharge of urine, although probably less frequent then, than some, from disregarding the extreme rapidity of decay in certain urines, have been inclined to suppose. It is most generally in the shape of an impalpable loose powder and not abundant, so that it often does not give rise to any particular local uneasiness, — a circumstance the more likely to occur, that the urine is in such cases not defective, but rather abundant in quantity. Sometimes however, the quantity of amorphous phosphate discharged is very great, so that the urine seems like milk from its turbidity and opacity. In such cases, and also where the earthy phosphates present themselves in the form of palpable grains and calculi, the local symptoms occasioned are much the same as in the instance of lithic gravel. The constitutional symptoms of phosphatic deposition, whether amorphous or in visible particles, are commonly severe. There is generally great disorder of digestion, more chronic however than in lithic gravel; the bowels are much disordered by alternating costiveness, and a dark, fetid, sometimes yeasty diarrhœa; and the excitement of the circulation, instead of being of the phlogistic kind, as in lithic gravel, and connected with plethora, presents the characters rather of exhaustion, debility and irritation, — a small, feeble, often frequent, and irritable pulse, sometimes a tendency to imperfect hectic, with emaciation, debility, a haggard expression, and not unfrequently the general aspect of organic disease. In point of fact, phosphatic deposit and gravel are more frequently organic than functional in their origin; and when well-marked and of some standing, are generally connected either with calculus in the bladder, or with derangement of structure in the kidneys or other urinary organs, or with organic affections of the rectum, uterus, and other adjacent parts, or with injuries, organic disorders, and severe functional disturbance of the spinal chord. In phosphatic gravel the urine is commonly abundant, paler than natural, and of lower density, often ammoniacal when passed, or at least very soon afterwards, and disposed to become turbid on standing, or to form an iridescent pellicle. This condition of the urine should always be regarded with distrust. It appears, indeed, sometimes to exist temporarily under the influence of depressing emotions of the mind, or exhausting mental application; in other instances it seems even to occur as a permanent constitutional peculiarity without either the co-existence of organic disease in the urinary organs or elsewhere, or the supervention of phosphatic deposits in the urine; but more frequently it depends, like phosphatic deposit, upon organic disease, and in general it is not long unaccompanied with that form of urinary deposition. *Cystic gravel*, composed of cystine or cystic-oxide has been so seldom observed that little information is yet possessed of the symptoms with which it is associated. *Dr. Prout*, however, is inclined to the opinion that it is connected with organic disease in the kidney rather than with mere functional derangement; and consequently the symptoms are probably much the same with those of phosphatic gravel. The urine has hitherto been always observed to possess a greenish yellow colour and a peculiar odour, and it remains muddy and opalescent after long standing. *Siliceous* gravel, as was hinted above, is of dubious existence, though mentioned by most authors as one of the varieties. Cases of the apparent discharge of siliceous sand with the urine are by no means uncommon. But, with a single exception, those which have been thoroughly investigated have proved

to be cases of imposition. Practitioners are generally very averse to admit this interpretation; but it is right to be aware that the most respectable station of life, and the total absence of all apparent motive, constitute no sufficient security against imposition of the kind being practised, especially by females. The writer was once consulted in three distinct cases within a single fortnight, where the substance said to be passed evidently consisted of comminuted quartz. In one of these, which occurred in the person of a young lady of beauty and accomplishment, and in a respectable sphere of life, her attendant could scarcely be brought to believe in the imposture; so improbable was it rendered by the circumstances of his patient. The matter however, which had been passed very often during a period of some months, was clearly comminuted quartz, not always finely broken down; and on one fragment, which was afterwards examined along with *Dr. Bostock* in London, there were evidently two black specks of adhering chlorite. In a fourth case, which occurred in the infirmary of Edinburgh, the gravelly matter was brickdust, which was used in the ward for scrubbing the floor, and closely resembled lithic gravel. Many similar cases have been recorded by authors. It is right at the same time to add that *Dr. Yelloly* once met with particles of silica in the interior of a calculus, and that *Dr. Venables* has recorded a case where, to all appearance, siliceous matter was really discharged by the urine. The detection of pretended cases is always easy enough; the siliceous particles when examined with a common magnifier are seen to be sharp-edged, without any regular form, and with a fresh shining fracture. True siliceous gravel must either show somewhat of a regular crystalline form, or present a dull surface without sharp edges.

The practitioner should never trust to the symptoms now enumerated for distinguishing the several varieties of gravel. Where the gravelly matter can be obtained, its properties must be carefully examined; and where the other symptoms are present, without his being able to examine the gravel itself, he must in the meantime attend to the condition of the urine. Under the head of the several kinds of deposit which may be formed from the urine, their distinguishing characters have already been stated in detail; and those of the urine have been just described in relating the symptoms. But it may be right to recapitulate in the present place the whole method of investigation.

The lithic gravel is greyish, reddish, or brownish, insoluble in diluted muriatic acid, and easily soluble in aqua potassæ, commonly with evolution of ammonia. It consists of variable proportions of lithic acid and lithate of ammonia, the former of which generally abounds most in the crystalline, and the latter in the amorphous forms of it. The corresponding urine is scanty, usually high in density and colour, always at first acid to litmus paper, prone to deposit an adherent sand on standing, and often yielding with a few drops of nitric acid a cloud or flaky precipitate, which disappears under a boiling heat, accompanied commonly with a reddish or purplish change of colour. Phosphatic gravel is usually white or pale grey, and amorphous or crystalline; and it is insoluble in aqua potassæ, but easily soluble in diluted muriatic or acetic acid. It consists very rarely of phosphate of lime alone, sometimes of the phosphate of magnesia and ammonia, and often of both compounds. If ammonia be evolved under the action of potash it contains the ammoniaco-magnesian phosphate; if not, it contains only phosphate of lime. The corresponding urine is copious, pale, low in density, ammoniacal from the first or very soon afterwards, prone to decay, and often rendered turbid by boiling, a white flaky precipitate being separated, which is easily soluble on the addition of nitric acid. Oxalic gravel is commonly brown, ash-grey or bluish, compact, occasionally crystalline, sometimes smooth, sometimes tuberculated; and it is soluble in diluted nitric acid, scarcely soluble in diluted muriatic, insoluble in acetic acid, insoluble in aqua potassæ. The corresponding urine has been little studied. It is clear, probably pale and low in density, and if it contains, as seems not unlikely, a little oxalic acid, it will give with solution of muriate of

lime a white precipitate not soluble on the addition of a few drops of muriatic acid. Cystic gravel has a crystalline somewhat waxy appearance, and it is soluble in diluted muriatic acid, insoluble in acetic acid, soluble in solution of carbonate of potash, from which it is precipitated by carbonate of ammonia. The corresponding urine is greenish-yellow, of a peculiar odour, like that of the briar mingled with that of decayed urine, and it remains turbid after some hours' rest.

Causes and Pathology. The pathology of urinary gravel may be conveniently investigated in connexion with a statement of its causes. Gravel has been traced to originate for the most part in particular kinds of diet, or to be connected with organic diseases either in the urinary organs or the organs of digestion; but it is also clearly connected with constitutional causes, sometimes obscure in their nature; and it is promoted by the sources of suppressed transpiration, and by certain circumstances connected with the period of life, being more frequent in infancy than in youth, and most frequent of all after the age of forty, as well as in old age.

By far the most common cause of gravel is the mode of living in respect of food and drink. It is not improbable that a certain constitutional tendency must generally concur before any particular mode of living will prove effectual. But there can be no question that such constitutional tendencies are often inoperative, except under the conjunction of erroneous diet; and there is a probability that erroneous diet may in some cases prove singly adequate to induce disease. Now from what was stated above, in speaking of the varieties observed in healthy urine, it appears that the kind of urine which is found to be associated with the most frequent variety of gravel, is that which is formed under a diet comparatively dry, superabundant in nutritive principles, and absolutely or disproportionately abounding in azotiferous or animal principles; in short, rich, nutritive, solid, and in excess. Such diet may be long followed by many without leading to such superabundance of solids in the urine as will engender disease, provided it be conjoined with vigorous exercise, and not with other excesses. But when associated with indolence and general luxurious living the lithate of ammonia is apt to become excessive in quantity; in particular constitutions the same evil ensues without any cooperating circumstance in the mode of life; and thus are formed a large proportion of the ordinary cases of gravel, which are met with chiefly among people in the middle station of society, overfed, and sparing in exercise. A thousand interesting facts place beyond all doubt the influence of good living and azotiferous food in augmenting, as well as that of moderation and unazotised aliment in lessening, the tendency to lithic gravel and the lithic diathesis. Comparative physiology and the accurate experimental researches of *Magendie* and of *Krimer* show that unazotised food dilutes the urine, and removes from it much of its lithic acid, while azotiferous food, on the contrary, produces concentration with superabundant secretion of lithic acid; and daily experience illustrates the application of these fundamental facts, both in accounting for the origin or maintenance of gravel complaints, and in effecting their removal.

It is not general full living alone, however, which constitutes a diet favourable to the development of gravel. Particular articles of food and drink are often as much in fault, nay even more so, than either excess in quantity or in nutritive quality. These are chiefly articles that cause indigestion, or which are hard of digestion, or overabounding in azote, or acescent; to which may also be added calcareous waters. A tendency to indigestion is common among people liable to gravel. In such persons, it is notorious that their urinary ailments are invariably aggravated, or their fits of suffering apt to be brought on, by any thing which occasions a dyspeptic attack, especially if accompanied with acidity of stomach. The reason is, that if acid be secreted in undue quantity in the stomach, it is excreted in undue proportion with the urine, and the lithate of ammonia is in consequence decomposed, so that lithic acid is precipitated. Substances difficult of digestion would even seem to favour

gravel, though positive indigestion be not excited by them. In this way, for example, some have plausibly explained the frequency of calculous disorders in certain English counties, such as Norfolk; where the working classes are in the practice of living much on rich heavy puddings, hard of digestion. The influence of highly azotiferous aliment is easily understood, since the excess of azote derived from them must be thrown off by the urine in the form of lithic acid. Accordingly, even in a state of health, there is no article which increases so much the density of the urine, and the deposits formed from it on cooling, as cheese; and to most persons who are subject to gravel, it is found to be injurious,—towards which result its indigestibility may also contribute not a little. Acids and acescent articles of food and drink, especially perhaps the acescent wines, are also very apt to aggravate the sufferings of those affected with gravel; and their habitual use seems even adequate to engender the disease. Their mode of operation is well ascertained; either by their own acidity, or by engendering acidity in the stomach and the over-secretion of muriatic acid there, they tend to increase the acidity of the urine. The effect of the habitual use of water, abounding in calcareous salts, has been very long an admitted fact in the etiology of gravel. The old belief in the influence of this cause seems warranted by the increased suffering which these waters occasion where a calculous tendency pre-exists, and by the comparative frequency of the disease in districts where they are prevalently used for drink and culinary purposes.

The operation of errors in diet has been hitherto chiefly traced in its relations to the lithic variety of gravel. The dietetic causes of the other rarer forms, if any such causes do exist in their instance, are at present little understood. All positively known on the subject are the facts that, where a tendency prevails to phosphatic gravel, this is aggravated by indigestion, howsoever induced; and that oxalic gravel, or calculus, may be occasioned by the habitual use of sorrel and other vegetables that contain oxalic acid.

Gravel has been clearly produced in some instances by injuries of the spine, such as blows upon the loins or severe falls, producing concussion in that quarter. *Dr. Prout*, who adverts particularly to this cause, has added that, in his experience, the kind of sediment produced is invariably the amorphous form of the phosphates.

Another exciting cause of gravel, which has been satisfactorily ascertained, is the existence of organic diseases in the urinary organs or in the organs of digestion. It would appear that almost any source of irritation in the kidneys, depending upon organic disease, may occasion sedimentary discharges with the urine, and consequently prove the source of calculous complaints. Even chronic organic affections of the bladder not unfrequently, and occasionally too diseases of the urethra, have the same effect. An analogous cause, far from uncommon, is hæmorrhoids, especially when internal; the existence of which is even sometimes apt to be overlooked, on account of the urgency of the gravelly symptoms. The statement of *Dr. Prout*, that gravel occurs not unfrequently in connection with organic diseases of the liver, is consistent with general observation. But it is not every organic disease of that organ which presents such relations; nor has any attempt been hitherto made to determine precisely where the connection subsists. Organic diseases of the heart are often attended with excessive deposition from the urine, and not unfrequently with discharge of gravel; the symptoms of which obscure those of the primary and more formidable disease.

The variety of gravel which occurs in connection with organic disease in the liver or heart, is the lithic, with its modifications, the red and the purplish gravel. But where the calculous secretion is connected with organic disease in the kidneys or bladder, and also in most of the cases where it concurs with hæmorrhoids, the matter discharged is chiefly composed of the earthy phosphates, and in particular of the phosphate of magnesia and ammonia. It is worthy of remark, that in all circumstances where the kidneys or bladder are

subject to direct irritation, either from mechanical causes, such as the presence of a fixed calculus, or from chronic organic disease in their own textures, the calculous matter secreted in consequence of that irritation much more frequently consists of the earthy phosphates than of any other substances.

Among the exciting causes of gravel, a good deal of influence has been allowed by some authors to the sources of suppressed perspiration, more especially exposure to frequent cold, in conjunction with defective exercise. Probably, the continual diminution of the cutaneous exhalation from habitual exposure to cold may have the effect even of engendering a tendency to the disease; and there can be no doubt that unwonted sudden exposure is apt to induce an attack where the tendency has been already formed by other causes. A fit of gravel, for example, is often occasioned in those liable to it by getting wet while overheated, by exposure to chill night air, or by sitting on a cold stone. The effect of rough jolting exercise in exciting the symptoms of gravel is peculiar and intelligible. This cause cannot excite the disease; but where concretions are formed in the kidneys, it produces irritation there by displacing them. Hence few calculous patients can bear horse exercise.

The relations of general exercise to gravel are somewhat complex. Defective exercise, by diminishing the cutaneous transpiration, as well as by increasing the excrementitial part of the food through a diminished demand on the part of the system generally, greatly tends to favour and aggravate gravel. On the contrary, deposits from the urine are often removed by additional exercise increasing the demand, and improving the cutaneous transpiration, — a result which is particularly manifested in the persons of those who live high and indolently. In those disposed to gravelly deposition, however, it is advisable to avoid much exercise soon after meals; for the effect at this particular period seems to be rather to increase than diminish the deposit.

The dietetic and other causes now mentioned, efficacious as they often prove in their operation, nevertheless do not often give rise to an outbreak of the disease, unless under the co-operation of certain predisposing circumstances. Occasionally, indeed, cases will seem to arise under full, luxurious, intemperate living, where no predisposition can be traced. But on considering how vast a number of people in the middle station of society live in that manner to an advanced age, without showing any tendency to gravel, some reason will appear for doubting whether a predisposition may not be indispensable in all instances. In not a few individuals it would appear that nothing further is required to excite gravel than strong constitutional tendency; that is, the constitutional tendency may be so powerful as to lead to the formation of the disease under regular, moderate, or even abstemious living, as well as the avoidance of all other known causes exciting as well as predisposing. The writer has at present a lady under his care, who, though she lives most abstemiously and in a great measure on vegetable food, and is exposed to none of the other causes of gravel, has for many months been constantly tormented with gravelish complaints, and constantly passes urine of high density, and overloaded with free lithic acid. Such cases, however, are fortunately rare. It is consolatory to the patient and his physician to reflect, that a great proportion of cases arise under a superfluity of nourishment, aided by constitutional liability.

The physical characters of the calculous constitution are not clearly known; but it is often to be recognised by proneness to other diseases or by their actual existence. No fact is better established on this head, than that gravel is an hereditary complaint. Its connexion with gout is also clearly ascertained. Sometimes that disease is actually preceded by a fit of gravel. Full living, with hereditary tendency, is the most frequent and manifest cause of both disorders; both are often conjoined in the same individual; and gout is well known to lead to the secretion of lithic acid in other parts of the body besides from the kidneys. A liability to cutaneous diseases, especially of the scaly kind, has been found by *Sir Gilbert Blane* and *Dr. Prout* to be another constitutional morbid state in which gravel is apt to be formed. Age has obviously an important

influence. The lithic variety is frequent in the early years of childhood, and again after the age of forty, but especially about the age of fifty and sixty; but between puberty and middle age it is comparatively rare. It does not exactly appear why infancy should predispose to lithic gravel. The influence of advancing life however is easily understood: the predisposition begins to manifest itself at that period when luxurious habits are in general fully formed, and when habits of indolence also usually begin to creep on. The oxalic diathesis occurs at times in infancy, most frequently between puberty and fifty years of age, very rarely in old age. The disease is much more frequent among males than females, simply because the former far more frequently commit habitual excesses of the table. For the like reason it is more common among the middle ranks than in the working classes. It is more frequent too in sedentary than in active professions; because in the latter there is a greater demand for the surplus aliment habitually taken, which in the former must be more largely discharged as excrementitial matter.

Prognosis. The prognosis in cases of gravel may be deduced in a great measure from the foregoing facts and principles.

Important information may be drawn from the species of gravel discharged. The least unfavourable species is the lithic gravel, because it is not only the easiest to remedy, but is also least frequently associated with organic disease. On the contrary, the phosphatic gravel is commonly an unfavourable variety. If temporary, as when connected with fear, anxiety, or nervousness, it is of little moment, except as showing the existence of a predisposition which ought to be watched. But when permanent it is decidedly unfavourable, being then often associated with organic affections of the kidneys, bladder, or other viscera. The most unfavourable of all is that which is composed chiefly or wholly of phosphate of lime. This rarely occurs without organic disease in the mucous membrane of the kidneys or bladder; which indeed is in general further proved by the co-existence of mucus in the urine. Pink-coloured sediments are unfavourable, being commonly associated with organic disease. The oxalic gravel is troublesome to remove, and apt to occasion more torture to the patient than other forms; but it has not been found, like the phosphatic, to have a connexion with organic disease. Those cases are generally the most urgent in their symptoms and most difficult to remedy, where the concretions discharged are of some magnitude, obviously because, besides the secretion of calculous matter, there is a risk of fixed calculi existing in the kidneys, or forming in the bladder.

Accurate deductions may also be formed as to the result, from the circumstances in which the disease originates. It is unnecessary to specify these particularly, as they may be at once perceived on referring to what was said above under the head of *Causes.* It may be sufficient to mention here, that among the ordinary run of cases those are most unfavourable where a disposition to the disease has been strongly manifested by hereditary right, and in absence of the chief known exciting causes, namely, free living and sedentary habits.

Lastly, the prognosis may be safely regulated by the influence of treatment. If judicious treatment speedily alters the characters of the urine from those which are known to favour calculous deposition, a favourable augury may be formed; and if the symptoms at the same time subside, the patient may for the most part be assured that his health and comfort are at his own command. If, on the contrary, the gravelly deposits and the morbid characters of the urine resist judicious treatment, the prognosis is unfavourable; frequent fits of gravel may be anticipated, and there is great risk of renal or vesical calculus.

Treatment. The treatment of gravel is now well understood; for which medicine has chiefly to thank the pathological discoveries of the medical chemist. It differs with the several species.

In lithic gravel the object of the treatment is to increase the quantity of urine, to lessen its density and surcharge of azotiferous principles, and for a

time to substitute an alkaline condition for its usual acidity; to which may also be added the maintenance of the cutaneous secretion. The requisite changes in the condition of the urine are to be attained, first, by diminishing the quantity and nutritive quality of the food; secondly, by increasing the drink and withdrawing acescent liquids; thirdly, by the administration of alkaline antacids; and, lastly, by enjoining regular exercise. In many cases it may be further necessary to remove dyspeptic symptoms, to correct excitement of the circulation or unusual irritability, or to enforce the avoidance of particular kinds of exercise. And in all circumstances an important accessary in the treatment is protection against irregularities of temperature, by warm clothing and a general diaphoretic regimen.

The most essential article of the treatment is the due regulation of the diet. Many cases of gravel are thus entirely remedied, and never sustain a relapse, except under occasional dietetic aberrations; while, without such measures, few cases of lithic gravel get permanently well through any other means. Where the disease has arisen under considerable excesses of the table, such as the unrestrained indulgence of the appetite, especially in rich azotiferous articles of food, a moderate reduction is often all that is necessary for effecting a thorough cure. Accordingly, in such circumstances, some get quite well on abandoning the practice of eating meat at breakfast, or by giving up altogether the meals of supper and luncheon. In general, however, more serious reductions are required; and sometimes it is advisable, for a time at least, to bring down the quality of the diet gradually, till it consists chiefly of vegetables and milk. Where the disease forms under ordinary moderate living as practised in the better ranks, and where of course a strong predisposition must prevail, the patient will seldom enjoy long freedom from his tormentor, unless he follow permanently a diet composed in a great measure of milk and vegetable food. The effect of this treatment has been well exemplified by the observations of *Magendie* on the subject in his work on gravel, as well as by his experiments, and those subsequently made by *Krimer*, on the influence of a purely vegetable diet in increasing the amount of urine, lowering its density, and diminishing its proportion of lithic acid. The rigorous system required in some aggravated cases by the principles advocated by the French physiologist, has been opposed by some as incapable of being enforced on the luxurious weak-minded epicure. But they forget that extreme measures are needed only in extreme cases, where the torture sustained by the patient is a powerful auxiliary to the physician in carrying his measures into effect. It is probable that few cases of lithic gravel will resist the dietetic mode of cure if pushed far enough, provided there be no contraindication, such as either a worn-out constitution or the concurrence of dyspepsia, the latter of which in particular often renders the regulation of the diet extremely difficult. *Magendie* mentions the case of a provincial magistrate long and cruelly afflicted with gravel under an abandonment to the pleasures of the table, who found it necessary for some weeks to restrict his diet to articles entirely vegetable, namely, tea, almond-emulsion, sugar-water, legumes, fruit, rice, and gruel, and who in six weeks got quit entirely of the gravelly deposit in his urine, together with all its accompanying torments. Certain articles of food should be carefully shunned, as being always found injurious in gravel. These are chiefly acescent substances, cheese, pastry, dumplings, rich puddings, unfermented bread, and generally all substances hard of digestion.

Among other beneficial effects of a diet more vegetable in nature than usual, an increase in the quantity of the urine is an important result. This object, however, must be further secured by augmenting the quantity of the drink. The drink should consist of the more simple diluents. Spirituous liquors are commonly hurtful; wines are also generally injurious, especially the wines of France and Germany; and where it is necessary to allow the moderate use of wine, sherry is usually found to answer best. Acids for the most part are hurtful. Even the citric and tartaric acid are injurious by their action on the stomach,

although some chemical physicians are inclined to allow them, because they are known to be decomposed, and to pass by the urine in union with alkalis and converted into carbonic acid. Drinks acidulated by carbonic acid are not detrimental; and hence sound malt liquors, especially table-beer strongly hopped and used in moderation, may be generally allowed with safety.

As the urine in lithic gravel possesses an acid reaction, while lithic acid is easily soluble in alkalis, and these taken internally pass off readily by the kidneys, the administration of alkaline remedies constitutes a rational and in reality an effectual method of cure. In certain circumstances too they fulfil a collateral object of no little moment, by correcting acidity of the stomach in dyspeptic cases. The utility of alkalis was first suggested by the success obtained from Stephen's nostrum for stone and gravel, the essential ingredients of which were lime and soda in the form of soap. It has been since found that the fixed alkalis, either in the caustic state or in that of carbonate or bicarbonate, answer equally well, if not better; and now the most approved method is to administer the bicarbonate of soda* or potash, in the dose of ten or twenty grains twice or thrice a day in any convenient vehicle. An objection has been brought against the continued use of alkalis, that they tend to debilitate the stomach, and likewise to induce the substitution of phosphatic for the lithic deposit in the urine. The former inconvenience, however, is only occasioned by their abuse, and is probably more frequent where the caustic alkalis or their carbonates are used instead of their bicarbonates. The latter objection to the use of alkalis has been for some time an article of general belief in medical practice. It has been thought that the alkaline condition of the urine, induced by their administration, must have the same effect with the ammoniacal state of the urine induced by natural causes, in favouring the development of phosphatic deposition; and cases of the apparent exchange of the lithic for the phosphatic diathesis have been mentioned by various authors. The influence of alkalis in this respect, however, has been overrated. The objection at all events would seem to apply to the caustic alkalis and their carbonates only. Their bicarbonates, much diluted, do not tend to excite the phosphatic diathesis: at all events they will speedily be seen to be even applicable, with certain precautions, to the treatment of the phosphatic as well as the lithic species of gravel. *Dr. Willis* mentions, that he has known the practice of taking alkalis internally kept up throughout a long life, without any apparent injury to the health; and the writer has known it maintained for twenty years. The alkaline bicarbonates are preferable to lime-water or magnesia, which are used by some as antacids in gravel. The best of all their forms is that of some alkaline aërated water, such as Vichy, St. Nectaire, Vals, Carlsbad, Bilin, Tarasp. The waters of Vichy have long been justly celebrated for their efficacy in the, treatment of gravelly complaints. In this country soda-water or kali-water with about a scruple of carbonate *per* bottle, may be usefully substituted. Like alkaline mineral waters, it has no tendency to substitute the phosphatic for the lithic deposit.

The last important article of the general treatment is regular, active exercise. The influence of defective exercise in favouring the development of gravel in predisposed constitutions, has been so much dwelt upon in the preceding pages, that it is unnecessary to add much on the subject in the present place. It is serviceable, notwithstanding that it tends to diminish the volume of the urine,—on the one hand, because it increases the cutaneous transpiration, and on the other, because it diminishes the proportion of excrementitial discharge from the food, by occasioning a greater demand for it in the form of nutriment.

Incidental circumstances often establish a necessity for accessary or incidental treatment. In the early stage of the disease in plethoric robust habits, or under very unusual indulgence at table, the circulation is frequently in a state of excitement, and the kidneys in a state of irritation, which may with

* In the London Pharmacopœia of 1836, termed *Sesqui*-carbonate of soda; which, however, the article of the shops seldom is, and never ought to be.

advantage be met, in the first instance, by general or local bloodletting. The torture occasioned by exercise, more especially of the active kind, or which agitates the body considerably, may render it indispensable to avoid every thing but gentle exercise, particularly walking; and at times absolute rest may be required for a period until the other articles of the treatment shall in some measure take effect. But, above all, very material modifications may be called for in the dietetic treatment already laid down, where the patient, as often happens, is subject to dyspepsia. In such cases it is difficult sometimes to regulate the food and drink properly. The dyspeptic symptoms may indeed be nothing else than the consequence of repletion, and are then removed along with the urinary disturbances by more or less abstemiousness. But in many cases, particularly in elderly patients, the functions of the stomach are decidedly enfeebled; indigestion, even under regular living, is a frequent occurrence, always to the serious aggravation of the renal complaints; and it is found impossible to enforce a rigorous vegetable diet, though that may be otherwise called for by the condition of the urine and the nature of the sediment. Here the ordinary treatment of dyspepsia is to be put in practice. A distinction must be drawn between the cases where the disorder is owing to simple irritability of the stomach, and those where defective or faulty chymification is its cause; for both forms of dyspepsia may concur with gravel. The former may be treated with local bloodletting or counter-stimulants, white bismuth, hydrocyanic acid, and other calmatives; the latter by bitters, chalybeates, and a diet chiefly animal, but sparing in quantity. In both forms the alkaline bicarbonates are habitually given, and serve an obvious double purpose. In both cases, too, gentle mercurials are often signally serviceable, directly for the improvement of digestion, and indirectly for restoring the healthy condition of the urine. Nay, even where the stomach is not affected, the administration of the blue pill every other evening, in conjunction with resinous laxatives, is sometimes of great use in correcting the morbid state of the urine. It scarcely needs mention, that, in all circumstances, constant attention must be paid to ensure the regularity of the alvine evacuations. This is generally best accomplished either by the combination already mentioned, or by the neutral salts, which possess the advantage of increasing the secretion from the kidneys.

The injurious effects of irregularities of temperature must be always carefully guarded against. It is unnecessary to mention the specialties of regimen by which this object is to be secured. Warm clothing, and the ordinary precautions against accidental chills, are of imperative consequence; and much advantage has been found in the regular use of the warm-bath, and in its occasional employment where the gravelly symptoms have been aggravated by exposure to cold or wet.

At one time much importance was attached to the administration of remedies for promoting the lithic discharge, under the supposition that the symptoms were occasioned by the suppression of the habitual deposit from the urine, and that nothing was of more service than "to bring away the gravel." This practice was carried to an injurious extent, thereby increasing the evil it was intended to diminish. Yet it is well known that, at a certain time of life, and in certain constitutions, namely, in gouty habits between the ages of forty and sixty, a long course of suffering from dyspeptic and urinary ailments is sometimes terminated by a copious discharge of gravelly sediment. It is rational practice, therefore, to endeavour to promote this discharge in such circumstances. Accordingly turpentine, cantharides, and other stimulants of the kidneys have been used with evident effect in bringing away gravel, and in relieving the patient's sufferings. Such practice, however, must be adopted with caution, and never persevered in unless upon sure grounds.

So much for the treatment in lithic gravel, the most common of all its forms. In the phosphatic species, measures somewhat different are required. A low, or vegetable diet is not indicated either by the constitutional derangement or

by the condition of the urine. The urine is not defective in quantity or overloaded with azotiferous principles; and the constitution is enfeebled by long-existing chronic disease. Accordingly a diet rather generous, consisting of nutritive digestible articles of food, and admitting even of the moderate use of wine or other stimulants, is found the most appropriate. A process of reasoning, somewhat analogous to that which constitutes the foundation of the alkaline treatment of lithic gravel, led to the treatment of the phosphatic species by acids: As the urine, which is acid in the former, has its properties corrected by alkalis, so it was inferred that acids would correct the alkalinity of the urine which usually prevails in the latter. The analogy, however, has not been found to hold good; for the administration of acids in cases of phosphatic gravel is not found generally to neutralise the alkaline state of the urine, and still less to render it acid in its reaction. Nevertheless, the administration of the acids, such as nitric and muriatic acid, is undoubtedly often of service in diminishing the deposit in the urine; which effect must, therefore, be ascribed to their action as general tonics in improving digestion and invigorating the constitution. It is generally maintained that the use of acids has a tendency to alter the diathesis, and lead to the exchange of the lithic for the phosphatic deposition. This is a much more rare occurrence than it was at one time, upon theoretical grounds, supposed to be; but still it appears sometimes to happen where acids have the effect of neutralising alkaline urine. Following out the analogy alluded to, physicians further inferred that, in phosphatic gravel, alkaline remedies must prove injurious; and this conclusion is in some measure correct, since the caustic alkalis and their carbonates certainly seem rather to aggravate the disease. But it was afterwards proved by *D'Arcet* that, if the alkalis be taken in the form of acidulous bicarbonates largely diluted, for example, in that of a natural alkaline water, such as the mineral water of Vichy, they will correct the phosphatic diathesis, remove phosphatic deposits, and greatly relieve the patient's sufferings, being, in fact, scarcely less serviceable here than in cases of lithic gravel. (*Annales de Chim. et de Phys.*, xxxi. 301.) His observations have been confirmed by the ulterior researches of *Petit* and *Chevallier*, on the effects of the water of Vichy in dissolving phosphatic as well as lithic calculi, which will be mentioned presently. The state of the bowels should never be neglected; and, in general, the most useful laxatives are the neutral salts, because they tend to increase the quantity of the urine. The addition of a little blue pill or calomel to any of the common resinous laxative pills has also been found to constitute a useful purgative; but mercurialisation must be avoided. The treatment of incidental and accessary disorders must be carefully attended to in this as in all other varieties of gravel; more especially must attention be paid to the organic diseases with which it often concurs, and of which it is generally a mere symptom. Attacks of acute or protracted pain must be combated by calmatives and anodynes. In severe phosphatic gravel the regular use of opium or other anodynes is commonly required, not merely on account of pain, but likewise to mitigate irritability, anxiety, and restlessness. Tonics, too, are commonly called for, such as uva-ursi, pareira-root, and other tonic bitters and astringents.

The treatment in oxalic gravel does not differ essentially from that laid down for lithic gravel, except in so far as abstemiousness, or a vegetable diet, is not so peculiarly called for. An antiphlogistic regimen, however, is often necessary at the outset; but afterwards moderate living, regular exercise, and the use of the alkaline carbonates, with warm clothing and occasional warm-baths, constitute the chief articles of the treatment. All articles of food which contain oxalic acid ought to be carefully avoided, more especially sorrel and wood-sorrel; but indeed acids generally are to be shunned as more or less injurious. *Dr. Prout* has suggested, that advantage may be found in trying to convert the oxalic into the lithic diathesis. It was remarked above, that this conversion always takes place sooner or later in the course of the disease by the efforts of nature. *Dr. Prout* puts the question, whether it is not advisable

to produce this change artificially, which he found to be accomplished by means of muriatic acid; for in this way a known disease, amenable to treatment, is substituted for one which is obscure, and whose treatment is little understood. He adds that, on applying these ideas to practice, he has found immediate relief follow a copious discharge of lithic sediment.

The treatment of other forms of urinary gravel is necessarily little understood, as they are of rare occurrence; and their relations to remedies have been seldom made the subject of careful inquiry.

URINARY CALCULUS.

Symptoms. — State of the urine. — Composition of urinary calculi. — Treatment.

When gravelly concretions attain such a size as to remain for a length of time or permanently in the kidneys, bladder, or urinary passages, the disease is named *Calculus*. The passage from gravel to calculus is gradual or imperceptible, and the one is frequently united with the other. They are closely allied in all their relations. They originate in the same causes and circumstances; they are composed of the same ingredients; they are indicated by similar symptoms. It is chiefly in the treatment that any material difference is presented. Even here there is in some measure an identity between them; which indeed only ceases when the surgical art is called in to the aid of the physician.

As in the present state of therapeutic knowledge urinary calculus is seldom successfully treated without the art of surgery being called into requisition, the whole subject has been usually considered as belonging rather to the domain of surgery than of physic. A full exposition of it would be therefore out of place in this work. A condensed view of the general subject, with a more detailed statement of its strict relations to medical practice, is all that seems necessary.

Symptoms. When a calculus is impacted in the kidney, it may not for a long time give rise to any uneasiness; but when it manifests itself by symptoms, they are almost the same with the sufferings occasioned by urinary gravel. There are frequent pains in the loins, extending towards the groin or testicle, or point of the penis, retraction of the testicle, nausea and vomiting, painful and frequent micturition, often bloody, and often too attended with the discharge of sand or larger stony concretions. The peculiarities are, that jolting exercise is more apt to occasion acute pain in the region of the kidneys; that rest gives more relief to suffering; that after the morbid condition of the urine has been corrected by diet or otherwise, and gravelly deposits cease to be discharged, lumbar pains, hæmaturia, and other local annoyances continue to recur, especially when the body is subjected to sudden shocks or agitation; and that a fit of unusually severe pain, sickness, and dysuria is often followed by the discharge of a little calculus, and long or even permanent relief from suffering. In unfavourable cases other symptoms are superadded, indicating the occurrence of secondary disorders of the kidney, among which the most important are abscess, atrophy, and dilatation. The obstruction occasioned to the escape of urine may induce dilatation to such a degree as to expand the kidney into a membranous bag, which may even attain so great a size as to be felt in the abdomen. More frequently the constant irritation of the stone leads, on the one hand, to atrophy of the kidney, which is not marked, however, by any characteristic symptoms; and, on the other, to chronic inflammation, suppuration, and abscess, indicated by constant lumbar pain, irritability of the bladder, irregular fever gradually passing into hectic, together with the discharge of pus with the urine, and coagulability of that fluid by heat and nitric acid. In some rare cases, abscess thus arising has made its way outwardly at the loins. — The symptoms of the arrestment of a calculus in the ureter are intense acute pain somewhere between the region of the kidney and that of

the bladder, stretching along the course of the urinary passages to the point of the penis, the testicle, or the inside of the thighs, and often attended with great tenderness on a circumscribed spot of the abdomen, corresponding with the seat of the impacted calculus; constant and often ineffectual calls to pass urine, which, after a time, passes tinged with blood, or mixed with clots; severe nausea and vomiting; and extreme anxiety and agony. These symptoms generally cease on a sudden; and then it is not uncommon to find a calculus discharged ere long by the urethra, or a large quantity of gravelly particles and sand. The calculus is sometimes permanently retained in the ureter; in which case the acute symptoms, if ever present, pass off, and symptoms of organic disease in the kidneys arise. Various organic diseases may probably be thus occasioned; but most generally the obstruction causes distension of the upper part of the ureter, distension of the kidney, and atrophy of its glandular structure.—When a calculus is lodged in the bladder the symptoms are somewhat different. Occasionally it may remain for a great length of time, and increase to a large size without giving any uneasiness. In many other cases it occasions for a period only frequent micturition, ill-defined uneasiness at the neck of the bladder, and a sense of weight, pressure, or slight pain there immediately after the urine is evacuated. Its characteristic effects are frequent calls to make water; a sense of weight in the lower pelvis, and especially at the neck of the bladder; sudden pain there excited by exercise, especially of a kind which jolts the body; discharge of blood, particularly after such exercise; sudden arrestment of the flow of urine, with immediate ineffectual efforts and pain. As the disease advances the micturition becomes more and more frequent and painful, the pain which succeeds every discharge is more prolonged, a dribbling of urine follows, blood also often flows after the urine, and mucus streaked with blood begins to pass likewise; gravelly sand escapes in increased quantity, which after a time consists chiefly of earthy phosphates; and there is a constant itching and pain of the glans penis, which, in children particularly, leads to frequent squeezing and pulling, and consequent elongation of the prepuce. In this, the advanced stage of the disease, there is also marked constitutional disturbance; defective appetite and digestion, disturbed sleep, feverishness and a tendency to irregular hectic; debility, incapacity of mental or bodily exertion, emaciation, and a haggard expression of the countenance. Under such symptoms the patient, unless relieved by removal of the stone, at length dies exhausted with constant excessive torture and increasing irritative fever. The immediate cause of death is most generally inflammation of the mucous membrane of the bladder. When the symptoms are so well marked as those just detailed, there can be little doubt of the existence of a calculus in the bladder. For complete satisfaction in such cases however, and of course still more where the disease, being in its early stage, is more obscurely indicated, it is necessary to have recourse to the operation of sounding the bladder. This should be done when the patient has been for some time quiet and free of suffering. Its correct execution depends on a species of skill which the physician cannot be expected to acquire; so that in the present sketch the manner of performing it need not be described. Sometimes a small calculus, which has escaped from the ureter into the bladder, becomes impacted in the urethra, in consequence of being too large to pass along its canal. This accident is indicated by a sense of obstruction and stinging pain in the part, great difficulty in passing urine, which either comes away in drops, or more frequently is retained altogether, and best of all by careful examination with the sound or catheter.

Urinary calculi vary much in size and form. Renal calculi are generally of small size, often no bigger than a pin's head, and seldom larger than a pea; and they are most commonly found in the uriniferous tubes, where they converge to form the mammillæ. From the points of the mammillæ they sometimes project into the infundibula; and occasionally they fill and distend the whole pelvis, and ramify into the infundibula, in which case they may attain a

large size, calculi of this kind being at times found as big as a tennis-ball, and of the weight of two or three ounces. In the bladder they often attain an enormous magnitude. Calculi weighing twelve ounces have been extracted during life, and one has been found in the bladder after death which weighed forty-four ounces. They commonly assume a flattened oval form, sometimes present a contraction in the middle like an hour-glass, and where several exist in the bladder at one time, they tend to assume the cubic or trapezoidal shape. Their surface is sometimes uniform and smooth, sometimes uniform but rough and semicrystalline, often somewhat like the roe of a fish, and occasionally rugged and botryoidal, in which case they commonly consist of oxalate of lime.

Composition. Calculi, whatsoever their size, and wherever lodged, are essentially composed of the same ingredients with urinary gravel. They are sometimes formed on a nucleus of foreign matter, which may be either derived from within the body, such as a mass of fibrin or clot of blood, or introduced from without, such as a broken fragment of a catheter, a portion of a bodkin, a bit of bone, a tooth, a pebble, and the like. More generally the nucleus is itself a small calculus, which commonly consists of lithate of ammonia, sometimes of oxalate of lime, rarely of any other substance. Around the nucleus as a centre calculous matter is arranged in concentric rings, sometimes loosely aggregated, more commonly dense, hard, and compact. The innermost layers are for the most part composed of lithate of ammonia; and in a great proportion of cases either of this substance, or of oxalate of lime. Often there is no other material deposited but one or other of these compounds; which, therefore constitutes the entire mass of the calculus. Occasionally the lithate and oxalate form alternate layers. It is seldom, however, that a calculus attains a considerable size without presenting the earthy phosphates as the chief constituents of its outer part. In conformity with the general law, that irritation from mechanical or organic causes cannot long subsist in the urinary organs without occasioning the development of the phosphatic diathesis in the urine, it is found that all calculi, whatsoever their composition in the first instance, sooner or later proceed to grow by the deposition of phosphate of lime and phosphate of magnesia and ammonia on their surface. The last-mentioned substance is sometimes beautifully crystallised, an appearance which is particularly observed in calculi that have attained a considerable size in the kidney. Phosphate of lime is not so frequent or abundant as the ammoniaco-magnesian phosphate; and it very rarely constitutes the sole ingredient of a calculus. Where it constitutes the chief or sole ingredient, the kidneys are affected for the most part with irreparable organic disease. It is held by some that when the phosphatic diathesis of the urine has been once constituted, and phosphatic layers have once been formed on a calculus, its constitution no longer undergoes any change; but that all its subsequent growth is phosphatic in composition. Such is the general rule. Yet there are some exceptions: the varying composition of the successive rings of large calculi clearly shows that after the phosphates have for some time been deposited, the diathesis of the urine may undergo a change, and the lithate of ammonia be formed for a considerable length of time. The cystic oxide is rarely found in calculi; and when met with, it constitutes almost the entire concretion, which has a greyish colour, and uniform crystalline structure. In some rare cases the layers of stony matter have been observed to alternate with strata of a soft animal matter like fibrin or coagulated albumen. An extremely rare variety of vesical calculus consists only of lithate of soda. A very rare form of calculus, which has not yet been found in sedimentary deposits, is that called xanthic oxide, from its yellowish-red colour. It has only been met with once, and is therefore of little interest. It is best known by the effects of nitric acid, which dissolves it, and forms a solution, which leaves a yellow residuum on being evaporated; and this forms with water a solution which becomes colourless with acids, and carmine-red with aqua potassæ.—In every case there is a

considerable quantity of animal matter intermingled with the proper calculous material, the particles of which it unites and firmly binds together.

Treatment. For at least a century past the treatment of urinary calculi has been a subject of intense interest; the most eminent names in surgery and physic are associated with the inquiry; but the advancement that has hitherto been made, is scarcely conformable with the amount of scientific research and practical experience which have been brought to bear upon it. Valuable information nevertheless has been acquired already; and it is the opinion of some that important discoveries may be anticipated, by which this branch of therapeutics will be eventually removed from the low position which it still occupies.

Calculus in the kidney is to be treated precisely as directed for gravel. The alkaline bicarbonates much diluted, and surcharged with carbonic acid, should be given regularly; the quantity of urine may be further increased advantageously by diuretics; the warm bath is serviceable for putting an end to severe fits of suffering; the diet must be carefully regulated as directed before; the occasional removal of blood from the loins by leeches or cupping is also advisable; and even counter-irritation by setons and issues may be sometimes proper, in order to avert or remove chronic inflammation and abscess.

The arrestment of a calculus in its passage down the ureter may be advantageously treated by the warm bath, opium, and bloodletting where the constitution will admit of it.

Calculus in the bladder is in the present day most generally viewed as a disease which can be fundamentally removed only by surgical aid; and two methods are familiarly followed, that by excision, or lithotomy, and the method by crushing or grinding the stone in the bladder, which is called lithotripsy and lithotrity. In all cases however, much may be done to retard the progress of urinary calculus, and relieve the patient's sufferings by treatment strictly medical; and the sentiments of some high authorities, both in physic and surgery, tend to the doctrine, that the efficacy of medical treatment, in accomplishing even a thorough and radical cure, has been in the present day underrated. The facts and arguments to this purport have been well brought together by *Dr. Willis*, whose work may be advantageously consulted for a detailed exposition of the principles on which the modern treatment of calculus in the bladder is founded, as well as for much valuable literary and practical illustration.

The treatment of vesical calculus, so far as regards the correction of the diathesis under which it has arisen, the arrestment of its further growth, and the mitigation of suffering, is quite the same with that laid down above for urinary gravel. But for some time past medicine has proposed for itself a higher problem,—namely, the destruction of the calculus in the bladder by means of remedies of the nature of solvents. The history of this department of therapeutics is not without interest. In 1743 the British parliament purchased from a Mrs. Stephens the secret of a nostrum then in great repute, by which it was alleged that stone could be dissolved in the bladder, and of which the active ingredients were found to be calcined egg-shells and soap, that is substantially lime and soda. It was afterwards inferred, still without any precise knowledge of the nature of urinary calculi, that the alkalis and alkaline earths in general, both pure and carbonated, would prove equally efficacious; and the inference seemed to be justified by actual trial. Subsequently it was recollected that the French surgeon *Littre* had, towards the commencement of the century, recommended copious dilution by mere water as a useful method of occasionally dissolving stone; and this probably, together with previous empirical experience, led to the employment of the natural alkaline waters as an article of scientific practice. At length the discovery in recent times of the variable nature of urinary calculi occasioned the substitution of acids for alkalis in some forms of the disease, and the material error of administering alkaline remedies in a more concentrated form under the supposition that their solvent power would be more effectually exerted. Up to this

period the sentiments of physicians, surgeons, and chemists were much divided as to the real value of the solvent methods of cure; and on the whole, although the treatment by alkalis and acids has always been admitted to be very serviceable in gravel as a positive cure, and also in calculus as a palliative for correcting the calculous diathesis, its reputation as the means of absolutely destroying stone in the bladder has been declining. Very recently however, a new impulse has been given to medical belief on this subject; and the researches of *Sir Benjamin Brodie* in England, and those of *Messrs. Petit* and *Chevallier* in France, seem to show that the solution of calculus in the bladder is not by any means so hopeless an undertaking as many in the present day are apt to imagine.

Solvents are administered either by the mouth, or by directly injecting them into the bladder; but the former method is commonly preferred.

In cases of lithic calculus, the solvent generally preferred is the bicarbonate of soda, which is administered to the extent of three, four, six, or eight drachms in the day, largely diluted with two or four pints of water, or in the form of a natural mineral water, such as that of Vichy. In phosphatic calculus the nitric or muriatic acid, in a state of considerable dilution, has been generally considered the most appropriate solvent. But, although no doubt can exist of relief being often thus obtained from suffering, and though some positive cures have been recorded, the efficacy of these remedies is questionable, more especially as they seem at times to act injuriously by merely changing the diathesis and leading to the substitution of lithic for phosphatic deposition, In the present day the acids may be for the most part abandoned; since it has been fully proved, that, in opposition to the belief recently entertained, the phosphatic diathesis is not aggravated by the alkalis when properly administered, and that their bicarbonates largely diluted will correct the diathesis, and dissolve calculous concretions even more effectually where the deposit consists of the earthy phosphates, than where it is composed of lithic acid and lithate of ammonia. For the proof of the efficacy of the alkaline bicarbonates in dissolving phosphatic as well as lithic calculus, medicine is mainly indebted to the late experiments and observations of *M. Petit* and *M. Chevallier* made with the aërated alkaline water of Vichy. They found that calculi of lithic acid, ammoniaco-magnesian phosphate, or the mixed phosphates, when immersed in the mineral water of Vichy at the temperature of 96° Fahr., were completely dissolved in no great number of days, provided the water was often changed or supplied in a continuous stream; but that comparatively little impression was made upon calculi consisting of the calcareous phosphate alone, or of oxalate of lime. Now it is easy to administer bicarbonate of soda, either in the shape of an alkaline mineral water, or in the state of simple solution, in such quantity as to communicate solvent properties to the urine; and therefore the solution of calculus in the bladder does not appear by any means so impossible a problem as most have believed. In fact, since the researches of *Petit* and *Chevallier* fixed the proper method of administering alkalis, a considerable number of unequivocal cures have been published, where a calculus of some magnitude was distinctly ascertained in the first instance to exist in the bladder, and after a few weeks was discharged in the form of a small corroded concretion, leaving the bladder quite free. Diluted solutions of the alkaline bicarbonates seem equally applicable to the treatment of cystic-oxide calculi as to those already mentioned. In short, the only varieties in which they are not likely to prove of service are those composed of phosphate or oxalate of lime, which constitute about a twentieth part of the whole; and even here the remedy, if it does no good, can at all events do no harm. It is an interesting fact, that although the diluted alkaline bicarbonates have a decided solvent power over urinary calculi both within and without the bladder, yet, according to the researches of *Mr. Brande* made some time ago, the carbonates have no such influence even upon lithic calculus out of the body.

As it has been thought by some to be difficult to impart to the urine a suffi-

cient solvent power by means of remedies taken into the stomach, it was long ago proposed to introduce the solvent material into the bladder. But although the proposal was plausible, and success was announced so early as the middle of last century, the method by injection has gained few converts, because a dread has been entertained lest the solvent should exert its properties on the bladder as well as upon the stone. This dread was no groundless one, so long as it was conceived that calculi could not be attacked except by acid and alkaline solutions of considerable strength. It being now however well ascertained that concentration is far from necessary, it is time that the speculations of our predecessors should be put to the test of experiment on a large scale, with weak solutions of acids or alkaline bicarbonates. The attempt has been already encouraged by the example of *Sir Benjamin Brodie.* He has proved that a mixture of two minims and a half of nitric acid in every ounce of water may be injected with perfect safety, even into a tender irritable bladder; and in one instance he succeeded in accomplishing a cure by using an injection of this strength for fifteen or thirty minutes every two, three, or four days. (*Lond. Med. Gaz.*, viii. 355.) The best method of practising injections into the bladder is to introduce a double-tubed catheter, and with the aid of any convenient contrivance to make the dissolving liquid pass and repass several times so as to maintain a continuous stream. In cases of lithic calculus the liquid may be either a weak solution of bicarbonate of soda, or lime-water: in the case of the earthy phosphates it may be either water acidulated with nitric acid, or the solution of bicarbonate of soda.

The only other remedy which requires mention here is one which has never been fairly tried, but to which some have looked with considerable confidence for the means of disorganising, breaking up, and removing calculus in the bladder. This is galvanism. It has been proved that calculi, especially of the phosphatic kind, if included between the points of the conductors of a galvanic battery, may be gradually broken down and reduced to the state of sandy gravel; and it has been further ascertained that a calculus, introduced into the bladder of one of the lower animals between the conductors of the battery, may be thus treated, and eventually destroyed, without any injury being occasioned, or even any material pain. These facts were established some years ago by *MM. Prevost* and *Dumas;* but they have not hitherto been applied to practice.

The treatment of calculus when arrested in its passage along the urethra belongs strictly to the surgeon's province, and therefore needs mention only cursorily here. The discharge of the calculus may be sometimes accomplished by means of the warm-bath, a full opiate, a strong purgative clyster, or a tobacco injection; but frequently it cannot be removed without an operation. An attempt may be first made to extract it by means of the urethral forceps; and should this prove unsuccessful, an incision must be practised into the urethra over the calculus.

DIABETES.

THE term DIABETES has a twofold signification in the present day. Some restrict it to cases where the urine, abounding in quantity, is also saccharine in nature. Others, using the term in its original sense, apply it to all cases where the urine is increased in quantity materially, uniformly, and independently of the administration of diuretic substances; and they distinguish two species, the saccharine or *diabetes mellitus*, and the simple or *diabetes insipidus*. The former is a precise term, graphically designating a special diseased condition of the urine. The latter is inaccurate, because the

urine is seldom tasteless, and also vague, in so far as it has been hitherto employed to include several morbid states of the urine as worthy perhaps of being distinguished from each other as saccharine diabetes from the whole of them collectively.

DIABETES INSIPIDUS.

Varieties. — Causes. — Treatment.

Three distinct conditions of the urine have been usually arranged under the head of diabetes insipidus, but have been correctly distinguished from one another by every late writer of repute. In one the urine is simply diluted; in another it is defective in the proportion and daily discharge of urea; in the third the urea is in excess, both relatively to the other ingredients of the urine and likewise in respect of its own daily average discharge in health. To the last of the three the term *insipidus* is inapplicable, because the urine presents its natural, peculiar, strong taste, heightened rather than diminished. The three states have been conveniently designated by *Dr. Willis*, Hydruria, Anazoturia, and Azoturia, that is, watery, deazotised, and hyperazotised urine.

A uniform increase in the quantity of urine, from simple dilution merely, is an affection by no means uncommon, and not always deserving the name of a disease. Some people from the habitual heedless indulgence of thirst drink an unusual quantity of diluent fluids, the watery part of which passes off copiously by the kidneys. The same is often the case with the habitually intemperate, especially those who indulge to excess in the use of such liquors as London gin; and *Dr. Venables* says he has observed a similar condition of the urine from the inordinate use of acids, especially vinegar taken for guarding against corpulency, and also from the excessive use of effervescing draughts or soda-water. In others, who observe an ordinary diet as to drink, the urine is habitually increased by constant exposure to a cool atmosphere, especially in a sedentary occupation. Others present the same peculiarity from constitutional causes, and most generally in connection with unusual nervous excitability. A familiar example of the last kind is the occurrence of diabetes in females affected with hysteria; and equally characteristic instances may be occasionally met with both in males and females of a nervous temperament, though not liable to hysteria, in whom the affection shows itself by profuse discharge of watery urine in the forenoon chiefly. In all these varieties of hydruria, or simple diabetes, there is no departure from the healthy condition of the urine, except that it is pale, low in density, and very watery. Its healthy ingredients are all present, in due proportion to each other as well as quantity. There is likewise no constitutional derangement referrible to the increased renal discharge. The affection, in short, scarcely amounts in correct language to disease.

There is one description of cases, however, somewhat allied to those now mentioned, which constitute a true disease, a real diabetes insipidus, where the thirst is incessant and urgent, the flow of urine excessive, and harassing from the frequency of the calls to pass it, the appetite increased, and the mind and body somewhat impaired in tone, so as to be incapable of continuous exertion or steady application. Such cases have been sometimes confounded with diabetes mellitus. But they are at once distinguished by the urine being very low in density, destitute of sugar, and charged with its usual ingredients in such quantity as to yield the natural amount of daily solid excretion; to which it may be added that, although the body is unusually spare, there is not progressive emaciation and debility. Some cases of this nature have been observed which prevailed throughout life without abatement. In general it is a more temporary affection, though still always protracted and obstinate. In the most inveterate forms, the thirst and diuresis continue during the night as well as the day; but sometimes both symptoms diminish in the early part of the night, and disappear in a great measure for some hours in the

early part of the morning, — again to break forth, however, on the patient awaking for the occupations of the day. The quantity of urine discharged is sometimes enormous. The writer had lately under his care a case of the kind where from twenty-four to thirty pints of urine of the density 1004 were passed daily for several weeks; and some years ago was shown a case by the late Dr. Duncan, junior, where for a very long period the daily discharge was forty pints, and the density generally 1001.

The nature and cause of this form of disease are obscure. The most generally received doctrine regards it as fundamentally an affection of the organs of digestion producing inordinate thirst, and consecutively diuresis; but the nature of the primary disorder is unknown. It is most frequently met with among young adults of the labouring population. The treatment consists in the use of bitter tonics, opium, a nutritive unstimulating diet, destitute of articles either diuretic or provocative of thirst, and the due regulation of the appetite for liquids. The drink should be gradually diminished in quantity, allowed only in small portions at a time, and given sometimes acidulated with the mineral acids, sometimes in the form of soda-water. Where the disease occurs in a nervous temperament, metallic tonics, a generous diet, and vigorous exercise, especially in the forenoon, constitute the most serviceable remedies. When purgatives are necessary, the oleaginous and resinous kinds should be preferred, and the saline sorts avoided, as well as all others which may act diuretically.

The second disorder, usually arranged under the head of diabetes insipidus, is an inordinate flow of urine defective in the daily amount of urea. This form of diabetes corresponds nearly with the Anazoturia of *Dr. Willis*, to which, however, an increase in the quantity of urine is not altogether essential. The characters of the urine are extreme paleness and absence of odour, great diminution of density, so that it sometimes scarcely exceeds that of ordinary water, a feeble ammoniacal odour when kept, together with the formation of a white pellicle of the ammoniaco-magnesian phosphate, and extreme deficiency either of the whole solids or more peculiarly of urea. *Dr. Venables*, who describes a similar affection under the name of Diuresis simplex, maintains that the urine, even when fresh, generally abounds in carbonate of ammonia, into which the urea would appear to be resolved. (*Med. Gaz.*, xxiii. 814.) *Dr. Willis* has classified together a number of cases published by various authors where these characters were presented; shows that the disorder is usually attended with thirst, gnawing at the stomach, white tongue, constipation, parched skin, emaciation, debility, and lowness of spirits; and infers that it is connected in adults with organic diseases, or in children with the irritation of teething, or disordered digestion consequent upon weaning and improper food. In the experience of the writer it has been almost always referrible in adults to one or other of those forms of organic disease of the kidney which have been usually considered as belonging to the generic affection, granular degeneration; and in a majority of instances where an inspection was made after death, the kidneys were found much shrivelled, rugose, or roe-like on their surface, and with most of their cortical and much of their tubular structure destroyed. This subject will be taken up in detail under the head of Granular Degeneration, in the division of Organic Diseases of the Kidney. In the meantime it may be observed that in frequent instances, where the kidneys were found extensively diseased, and where death evidently arose from one or other of the affections secondary to granular degeneration, the urine presented for a long period the characters described above, being from five to ten, or even twelve pints in quantity, between 1004 and 1008 in density, slightly coagulable by heat and nitric acid, almost colourless, and deprived of one-half, three-fourths, or even more of its urea.

For the treatment of this affection, in so far as it occurs in connection with granular disease of the kidneys, the reader is referred to the article on that subject. The treatment recommended by *Dr. Willis* for anazoturia con-

sists in the administration of gentle aperients of the resinous or oleaginous kinds, bitter tonics, diaphoretics and anodynes, together with light nourishing diet composed chiefly of farinaceous and animal food, and slightly acidulated drink in moderation.

The third and last variety of diabetes insipidus is so named rather because the urine is destitute of the saccharine taste remarked in diabetes mellitus than with reference to the correct meaning of the specific name. It comprehends the cases characterised by an excessive secretion of urine superabundant in urea, and has been aptly designated by *Dr. Willis*, Azoturia. *Dr. Bostock* and *Dr. Prout* were the first to direct the attention of the practitioner to this disorder. It approaches saccharine diabetes in all its characters, except in so far as sugar is not present in the urine; and it is conceived by some to constitute occasionally the first stage of that disease. The urine is sometimes pale, at other times deeper coloured than natural, generally from four to eight pints in daily quantity, occasionally so high as sixteen pints, usually high in density, namely, between 1030 and 1035, but sometimes not above *Dr. Gregory's* average of 1024 or even 1020, always abounding in urea whatsoever the density, and commonly to such a degree as to yield crystals when treated with nitric acid without previous concentration, especially if exposed to moderate cold. The daily discharge of urea is at times very great: in an instance mentioned by *Dr. Bostock* it amounted to no less than nine ounces and a half, which is about four times the full proportion of health. The general symptoms are much the same with those which are to be described presently as characterising saccharine diabetes, but they are less in degree. There is much irritability of the bladder, occasioning frequent and urgent calls even during sleep, some thirst, at times inordinate appetite, though not invariably, uneasy gnawing sensations in the stomach, and more rarely some degree of dyspepsia, a feeling of languor, debility, and mental depression, an anxious expression of countenance, and a tendency to emaciation. These complaints, more especially the flow of urine, are apt to be increased by cold weather, and still more by mental emotions.

The *causes* of the affection are obscure. It has been observed most generally after the middle period of life, in connection with previous free living, habitual indulgence in alcoholic fluids, or early sexual excess, especially masturbation; or it has seemed to arise from irritability of the bladder, in connection with diseased prostate, hæmorrhoids, and frequent attacks of gonorrhœa. In children, too, it is probably not uncommon, as appears from the statement of *Dr. Venables* and *Dr. Willis;* who both mention that in children between six months and fourteen years of age they have repeatedly met with an inordinate flow of urine highly loaded with urea, attended with frequent calls, involuntary micturition at night, urgent thirst, voracious appetite, and emaciation. The causes of the affection in the latter circumstance are obscure; but it is generally found to end, if neglected, in tabes mesenterica and other inveterate strumous disorders.

The *treatment* of Azoturia has been well laid down by *Dr. Prout* and *Dr. Willis*. It is often successful, though the success is frequently but temporary. There can be no doubt that some of the alleged cures of saccharine diabetes have really been nothing else than this disorder, the reporters of the cases having contented themselves with ascertaining that the density of the urine was unusually high, and having neglected to determine positively the presence of sugar. When the circulation is in a state of excitement, and the patient disposed to restlessness, it is right to begin by drawing a little blood from a vein. Afterwards food in moderation, easily digestible, and composed of a rather large proportion of farinaceous matters, must be enjoined, together with the sparing use of diluent drinks acidulated with nitric or muriatic acid, or alkaline and aërated as in the form of soda water. Opium must be given regularly as a calmative and anodyne, and is perhaps the principal remedy. The general tone of the system should also be im-

proved by the administration of bitters, or still better perhaps of chalybeates; and the functions of the skin must be maintained by a moderately warm atmosphere, as much active exercise as may be well borne, the employment of the warm bath every other evening, and sometimes also the addition of ipecacuan to the opium in the shape of Dover's powder. A tendency to constipation which generally prevails must be encountered with gentle laxatives. All excesses of the table and otherwise must be carefully shunned. *Dr. Venables* says he has found a combination of kino with opium useful in reducing the amount of the urea; and he further recommends that the drink should consist in part of almond emulsion, where the neck of the bladder is very irritable, and the calls to pass urine frequent. Alterative treatment might seem advisable; but mercury ought not to constitute a part of it, as mercurials rather tend to increase the urea.

DIABETES MELLITUS.

Definition.—History.—Symptoms.—Characters of the urine.—State of the functions of the alimentary canal.—Of the blood and circulation.—Of the cutaneous functions.—Of the function of nutrition.—Pathology and anatomical characters.—Prognosis.—Treatment.

Authors even in the most recent times have differed with one another regarding the correct definition of diabetes mellitus; and although this may appear somewhat singular, considering the very prominent external characters of the disease, it is no more than ought to be expected from the present want of clear and precise views of its pathology. The definition, "*A discharge of saccharine urine, with great tendency to emaciation and suppressed transpiration,*" is probably less open to dispute than any other. Yet not one of the conditions embraced by it is altogether essential; for medical treatment may arrest for a time the emaciation, as well as restore in a great measure the functions of the skin; and the saccharine impregnation of the urine, possibly sometimes wanting at the commencement, is at all events undoubtedly absent often for many days before the close in fatal cases. There can be no question, however that the presence of sugar in the urine is by far the least variable of the phenomena which have been hitherto carefully studied; and that in many cases and circumstances, where this character was supposed to have been wanting, sugar might have been discovered by the more exact methods of chemical examination which are applied to the inquiry in the present day. The mere presence of sugar, however, in the urine is not alone sufficient to constitute the disease; at least *Dr. Prout*, as formerly observed, has maintained that sugar is at times present in dyspeptic and gouty people of advanced years without either increase of urine or constitutional derangement (p. 13.).

It is probable that the ancient physicians, although they misunderstood the characters, were nevertheless not unaware of the existence, of diabetes mellitus. This seems a legitimate conclusion from passages in the writings of Celsus, Ætius, Alexander Tralles, and especially Aretæus, who was aware of the tendency of the disease to induce emaciation, and considered it as a colliquation of the solids into urine. The earlier modern physicians contributed little or nothing to the knowledge handed down from the time of Aretæus; and it was not till 1684 that two of the most obvious and interesting characters of the disorder were determined by *Willis*, namely the sweet taste of the urine, and the frequent excess of that secretion over the quantity of liquids introduced into the body through the digestive organs. It was not till after the lapse of another century that any further advancement was made towards a correct acquaintance with its features, pathology, and treatment. But at length the inquiries of *Dobson* and *Home* into its pathology in the last quarter of the late century, with the observations of *Rollo* respecting its treatment, and the chemical researches of *Cruickshank* into the nature of the urine, paved the way for a whole host of modern inquirers, among whom the names of *Henry*,

Bostock, *Prout*, *Lubbock*, *Nicolas and Guendville*, *Bardsley* senior and junior, and *Macgregor*, stand most conspicuously; and whose united labours have rendered the singular properties of diabetic urine, and the multifarious phenomena of the malady itself, familiar to every physician, while they have also unfolded many valuable facts relative to its intrinsic nature, and established some important practical rules for its treatment.

Symptoms. Diabetes always begins with very obscure symptoms. Its presence is very seldom suspected until it is so far advanced that the urine has decidedly acquired a saccharine impregnation. At all events a true saccharine diabetes has not hitherto been traced satisfactorily in any instance by symptoms prior to the excretion of sugar by the kidneys. The inference however would not be legitimate that the excretion of sugar is one of its earliest signs, and still less that this character exists from the very commencement. For, how soon soever the attention of the physician or patient may be turned to the sweet taste of the urine, he will invariably find from other symptoms, such as the frequent or excessive discharge of urine, that the function of the kidneys has been materially deranged for a long time before. It has been already observed that, in the opinion of some, a *diabetes insipidus*, or excessive flow of urine, either defective, or more abundant than usual, in its natural contents, but without the presence of sugar, may form the earliest symptoms of saccharine diabetes; and the experience and researches of *Dr. Prout* in particular seem to render it not improbable that a superabundance of dense urine, loaded to excess with urea, may precede the stage at which sugar is secreted. But there is no certainty upon that very interesting question in the symptomatology of the disease. No case of well ascertained *diabetes insipidus* has hitherto been clearly traced passing into *diabetes mellitus*; and it is further well established, that until sugar is discharged with the urine, the disease is not accompanied by great constitutional disturbance. The description of the symptoms must therefore be commenced for the present from the period when the essential saccharine property of the urine is fully formed.

The first symptoms which attract the patient's attention are frequent evacuation of the bladder, indicated unequivocally by the necessity of awaking for the purpose several times during the night, superabundant discharge of urine, paleness of this secretion, with diminution of its proper odour; an inordinate appetite, sometimes attended with dyspeptic complaints; excessive thirst; dryness and harshness of the skin; loss of virility; and rapid loss of flesh and muscular strength. These too are the leading symptoms which continue to prevail at the time when curiosity on the part of the patient, or a careful professional scrutiny, leads to the discovery that the urine abounds with sugar. For many months, or even for several years, no material change may occur in the phenomena. At length, however, the weakness or emaciation having increased all the while more or less steadily, death takes place either slowly from progressive exhaustion, or more quickly from sudden sinking occasioned by injudicious attempts to restrict too much the food and drink, or more indirectly through the formation of phthisis pulmonalis, granular disease of the kidneys, or some other incidental acute or chronic disorder. Such is a brief sketch of the leading features of *diabetes mellitus*; which it will be necessary now to fill up. The clearest impression of them will probably be obtained by classing the symptoms according to the organs and functions chiefly affected; and therefore the following remarks will present a view of the symptoms referrible, 1. to the functions of the kidneys; 2. to those of the alimentary canal; 3. to the condition of the blood and circulation; 4. to the state of the cutaneous functions; 5. to the function of nutrition; and, lastly, to secondary or incidental affections.

Characters of the urine. The pathognomonic character of saccharine diabetes is the peculiar state of the function of the kidneys, occasioning a marked departure from the healthy properties of their secretion. The urine is increased in quantity both absolutely, and likewise for the most part in relation

to the fluid contained in the drink and food; it is also commonly increased in density, in its proportion of solid contents, and in the amount of solids daily discharged by it; and, further, it is essentially altered in its sensible qualities and chemical constitution.

One of the earliest symptoms, and invariably present afterwards until the disease begins to yield to treatment, is increase of the urine in quantity. When a case is first brought under treatment, the urine is found seldom to be under ten imperial pints in twenty-four hours; the average lies between fifteen and twenty-five pints; and occasionally it is observed to amount to the enormous quantity of thirty-six, forty, or even fifty pints. Some have not hesitated to assign even a wider limit, and 200 pints have been mentioned as having occurred in an actual case; but such facts are of doubtful authenticity. Unless under the influence of treatment, the quantity of urine is very rarely so low as the natural standard, especially in the more advanced stages; but at an early period it is not uncommon to find the quantity reduced by treatment to between fifty and sixty ounces, or a trifle above the amount of health. Not only, however, is the quantity increased absolutely; a more remarkable character of the urine is that it may be increased, so as habitually to exceed the whole fluids contained in the food and drink. This, though not a constant, is a common occurrence. It depends partly on the absorption of the fluids of the body in the course of the patient's emaciation, but in a greater degree on moisture being absorbed by the surface of the skin, or membrane of the pulmonary air-cells. That the excess of fluid in the urine is derived from without, and not from the body itself, plainly appears from the interesting fact mentioned by *Dr. J. L. Bardsley*, that the liquid discharged may exceed the alimentary fluids even where the patient is gaining weight. The difference is sometimes excessive. In a case not long ago under the care of the writer, it was ascertained, that, for at least four days, the liquids of the food and drink amounted to 48 ounces daily, while the urine was no less than 240 ounces.

A character of the urine scarcely less constant is an increase in its density, together with an increased proportion of solid contents, as well as an increased discharge of solids daily. The density of diabetic saccharine urine has been sometimes observed so low as 1020, in the writer's experience 1021; and under the influence of treatment it is not unusually brought down to 1032, 1030, or 1026, which are all within the limit of health. But far more generally, and almost invariably, where the case has not been for some time subjected to careful regimen, the density varies from 1035 to 1040, reaches frequently 1042 or 1045, and in some instances has been observed so high as 1050, or even 1055, which last is the highest that has ever come under the observation of the writer. Even higher densities have been mentioned, but they are not very authentic. In the case referred to, the average urine of the day was taken, the hydrometer was corrected by the weighing-bottle, and on four successive days the density was found to fluctuate between 1055 and 1055·4. It may be inferred from the increase of density, that the proportion of solids in the urine must also be increased. Instead of fluctuating between 30 and 68 parts in the thousand, which may be assumed as the healthy limits, the proportion often rises in saccharine diabetes to 90, 100, or 120; and the writer has observed it so high as 136. Further, the increase of density and proportional solids infers an increase in the daily discharge of solid matter by the urine. This circumstance, which was first distinctly dwelt on by *Cruickshank*, is one of the most pathognomonic characters of the secretion; and it is also one of the chief characters by which the physician may correctly judge of the progress of a case, and of the influence of treatment. The daily discharge of solids by the urine was formerly stated seldom to exceed two avoirdupois ounces and a half in highest health. But in diabetes, it is not uncommon to find the solid discharge so great as 22 or even 32 ounces; and in a case once under the writer's care, the amount was so high as 36⅓ ounces daily for a week together. The quan-

tity of solid matter discharged daily by the urine ought always to be a principal object of attention in studying and treating a case of saccharine diabetes. It is easily found by a simple formula, when the density and daily quantity of urine are known. The late *Dr. Henry* determined the fact, that the quantity of solid matter in one thousand parts of diabetic urine is equal to the excess of its density over that of water, multiplied by the number 2·58. According to the writer, however, the correct number deduced from many experiments is 2·33 Hence the daily discharge of solids may be found by the formula $D' Q \times 0{\cdot}00233$, in which Q represents the quantity of urine, and D′ the excess of its density over that of water. Thus, in the case last alluded to the daily discharge of 36·3 ounces is found from the density 1050, and the quantity *per* day 312 ounces, D′ being here equal to 50, and Q to 312. Another remarkable character of the urine is that the daily discharge of solids exceeds frequently the amount of solids taken in the form of food. This is by no means so constant a character as those already mentioned. It may be easily ascertained while the patient is under strict regulations as to food and drink, because the proportion of solids contained in the simple aliments which he is allowed to use is well known. Meat, for example, contains about a fourth of solid matter, bread two thirds, milk one seventh, cheese nine tenths, beef-tea and mutton-tea about an eighth. From these numbers it is easy to calculate pretty closely the ounces of solid matter consumed daily as food.

Not less remarkable than the properties of the urine already mentioned, are the changes which take place in its sensible qualities and chemical constitution. It is paler in colour than natural, presents a less characteristic urinous odour, is generally almost, if not altogether, free of deposit on cooling, and possesses for the most part a decidedly sweet taste ;—it is often deficient in urea, commonly deficient also in lithic acid, sometimes impregnated with albumen;—and, with a few rare and even doubtful exceptions, it contains a large quantity of saccharine matter, identical in properties with grape-sugar. Its properties vary at different periods of the day; that which is passed in the latter part of the day being commonly furthest removed from the healthy state. In the early stage of the disease, and still more when the case has been for a few weeks under treatment, the natural colour and odour, and even the urinous taste, may be in some measure present. But in all cases which have either been for some time neglected or are far advanced, the urine is nearly free of colour, its proper odour is wanting, or a mawkish sweet odour is substituted, it remains clear on cooling, and its taste is distinctly saccharine. Lithic acid is seldom present in any material quantity, and the earthy salts too are less abundant than usual. Till of late, on the authority of *Nicolas*, *Cruickshank*, and *Bostock*, it was believed that urea was always wanting. It was shown, however, by *Henry*, that, although he could not detect urea by the ordinary characters of this principle, it might be proved to be present in small quantity, by the property which the urine possesses of giving off carbonate of ammonia at the boiling temperature, a property which no other principle except urea could communicate. Others have since contributed more positive facts of the same purport. And at length it has been recently proved by *Mr. Macgregor*, that urea is probably always present in diabetic urine; that its proportion to the water of the urine, though commonly less, is at times positively greater, than in the healthy state; and that the absolute quantity discharged in a given time is more frequently above than below the natural standard. By first destroying the sugar by the process of fermentation, then concentrating the urine, and treating the residuum with alcohol, he obtained a substance with all the properties of urea, which in one instance constituted 43 parts in 1000 of the urine; and in four cases amounted to 512, 810, 945, and 1013 grains in twenty-four hours. It has been before stated that the largest proportion of urea assigned by any chemist to healthy urine is 30 parts in 1000; and that, proceeding upon that supposition, the daily discharge of urea may be considered 510 grains. These highly interesting and satisfactory conclusions of *Mr. Macgregor*, the writer can confirm from his own

frequent observation. More than ten years ago he found that urea might always be found in diabetic urine after the destruction of the sugar by fermentation; for some years past he has only once failed to detect it by the ordinary process of concentration, and the addition of diluted nitric acid; and in the last eight cases where this plan was followed, it was plain, from the liquid becoming a firm magma of scaly crystals, that the urea was increased in its daily quantity at least, if not also at times in its proportion. In a rather recent case, at present under the writer's care, the urine yields abundant crystals of nitrate of urea without being previously concentrated; and in this and another patient, also now under his care, the daily urea, during a pure animal diet, has been, for weeks together, so high as 630 and 884 grains. The failure of many experimentalists to discover urea, may be accounted for in a variety of ways, which it would be out of place to mention here. The plan which proved successful in the trials just alluded to, consists in concentrating the urine quickly over the vapour-bath at a temperature not exceeding 200° F. till a sixth part of its original volume remains; to add to this half its volume of the diluted nitric acid of the Edinburgh Pharmacopœia (consisting of equal weights of acid and water) previously cooled, and to allow the action to go on for some hours, aided by exposure to a moderate degree of cold. A firm magma of crystalline scales is not unfrequently thus formed in two or three hours, where no appearance of crystallisation presented itself earlier. The only other important alterations, and by much the most invariable changes which the urine undergoes in its chemical constitution, are those connected with the presence of sugar.

The presence of sugar may often be discovered by the taste of the urine. This, however, is a fallacious criterion,—at least as a test of the absence of sugar: and it consequently ought never to be relied on in the investigation of a suspected case, and still less for determining the real state of a case of apparent amendment. Frequently the urine has not a sweet taste, although one-half its solids consist of sugar; and simply, because the taste of this principle is obscured by the co-existence of the ordinary ingredients. The taste is seldom characteristic, unless the urea and other natural ingredients are materially defective in their proportion. Sometimes, when the taste of the urine itself is indistinct, the sugar may be detected by this sense in the residue left on evaporation to dryness. In all cases, it may be proved to exist by the action of nitric acid, aided by heat, in developing oxalic acid. But the simplest, most characteristic, and most delicate test of the presence of sugar is the process of fermentation with yeast. The addition of yeast to healthy urine does not give rise to any change; but if sugar be present, and the temperature be raised to about 80°, effervescence immediately ensues, a brisk discharge of gas takes place, and at length a yellowish fluid is formed, which has the odour of beer, and yields an alcoholic liquid by the process of distillation. The test is so delicate, that, as the writer has found, one part of diabetic sugar may be detected by it in 1000 parts of healthy urine, of the density 1030. It is further an easy, and the only correct mode of ascertaining the quantity of sugar. Every cubic inch of arbonic acid gas given off by fermentation corresponds in round numbers with one grain of sugar, or forty-seven of gas to forty-five of sugar. Hence the quantity of sugar may be easily found by filling a graduated tube with mercury, leaving space enough for a little more than the requisite quantity of urine, which is then to be introduced; next filling up what remains of the space with yeast, and, with the finger on the open end of the tube, reversing the tube in a vessel of mercury; and then placing the apparatus where it may be exposed to a heat of 70° or 80° for twelve or twenty-four hours. The sugar of diabetes exists with various modifications in different cases. Sometimes, though rarely, it is chiefly in the form of crystallisable sugar. Sometimes, as in a case which the writer had recently an opportunity of examining, it crystallises in grains on the edge of the chamberpot by spontaneous evaporation; and, by concentration over the vapour bath, is obtained at once in extremely pure light-grey grains, identical

in every character with grape-sugar. More generally concentration yields a confused or obscure brown sandy crystallisation. Sometimes the residuum is not crystallised at all, but forms a thick syrup of a honey-like odour, which, under protracted heat, dries into a substance like barley-sugar. And in all circumstances, the prolonged application of a rather elevated temperature converts the crystallisable into uncrystallisable sugar. The saccharine principle of diabetes, like other natural sugars, seems therefore to consist of varying proportions of a crystallisable and uncrystallisable substance. The best mode of obtaining the crystallisable part in ordinary cases, is to form an extract with as little prolongation of the heat as possible, to remove the uncrystallisable syrup by agitation with cold rectified spirit, and to boil the residual crystallisable portion in more of the same fluid, from which it will separate in grains on cooling.

Such are the leading properties of the urine in diabetes mellitus. Other deviations from the natural condition, of more rare occurrence, and probably depending on incidental causes, may be now also briefly mentioned. One of these is a tendency to early putrefaction, and the development of ammonia. This phenomenon, opposed as it is to the customary condition of diabetic urine, which for the most part corrupts slowly, occurs chiefly in connection with dyspeptic symptoms, and of course cannot present itself, unless where the urea is tolerably abundant. Another character of rare occurrence, at times connected with stomach complaints, but occasionally obscure in its relations, is the copious deposition of earthy phosphates not long after the urine is passed. Another rare property, particularly mentioned by *Dr. Prout*, and which the writer also has observed in one instance, is the spontaneous development of vinous fermentation, owing to the urine containing a species of ferment, which *Dr. Prout* considers to be modified chyle. This peculiarity might be observed more frequently, were it not that the urine in this climate is kept, during a considerable part of the year, at a temperature unfavourable to the process of fermentation. Another character, more frequently observed, is the presence of albumen, as indicated by heat. It is not uncommon to find, that when diabetic urine is concentrated to a half or a fourth of its volume, flakes are detached in small quantity. But sometimes, especially in rather advanced cases, a considerable coagulation is at once occasioned by heat, and continues after the addition of nitric acid, clearly evincing the presence of albumen. Albumen, when thus unequivocally existing, will probably be found to be associated with granular disease of the kidneys as a secondary or incidental disorder. At least, two cases of the kind have been lately traced satisfactorily by an inspection after death in the Edinburgh Infirmary; and in one of these, which will be adverted to hereafter, the sugar, at one time excessively abundant, gradually disappeared; the albuminous impregnation at the same time became more and more distinct; the density of the urine fell from 1050 and 1055 to 1010; and for more than three months before death the patient had scanty, pale, coagulable urine, low in density, and not fermentable.

Before leaving these remarks on the pathological characters of the urine, it may be right to present a summary of them, according to the state of progress of the disease. In the earliest period, it is not improbable that the urine is characterised by being above 1030 in density, high in colour, and abounding in urea as well as other natural ingredients. Most generally, when first carefully attended to, it is found very pale, scarcely urinous in its odour, little prone to become ammoniacal when long kept, high in density, excessive in quantity, defective in the proportion of urea but not in its daily quantity, defective also in its proportion of earthy salts, and abounding in sugar, which communicates a sweet taste and the property of fermenting with yeast. Should the case, however, have been previously for some time under proper treatment, then the colour of the urine is often less pale, its odour somewhat urinous, and, under long keeping, ammoniacal; its quantity not so excessive, yet still always

superabundant, especially considering its high density; the proportion of urea more abundant, its daily quantity excessive; and sugar also present, though frequently it is not to be detected by the sense of taste. As the disease advances, the influence of treatment here laid down ceases to be so manifest; the less favourable characters previously mentioned recur; and not unfrequently there is also some albumen, which may be separated by coagulation with heat. Lastly, towards the close, where death does not arise from incidental or secondary disorders, the natural condition of the urine is often observed to be restored for nearly a week or even upwards;—the quantity, colour, odour, and density being much the same as in health, the urea in the natural proportion, the sugar wanting, and the chief deviation observed from ordinary urine being, that putrefaction ensues with unusual speed.

State of the functions of the alimentary canal. It has been held by some authors, that the more characteristic symptoms of saccharine diabetes are invariably preceded by disorder of the functions of the stomach, of the nature of dyspepsia. It may be questioned, however, whether such is even generally the fact. In repeated instances, at least, the writer has been unable to discover that any stomach complaints whatsoever preceded the excessive discharge of urine.

When the disease is fully formed, there is usually urgent thirst and inordinate appetite; the tongue is clammy, reddish on the edge, sometimes altogether reddish and clean, more usually whitish, and often with a brown streak down the middle; the gums are reddish and tender; the throat dry; the breath often of a sweetish odour, like that of hay; and the bowels constipated, and liable to colic pains. The thirst is sometimes excessive and uncontrollable, so that twenty, thirty, or even forty pints of liquid are consumed in the day. The appetite is also commonly greater than natural. The urgency of this symptom, however, has been overstated by many authors. When the case is not under treatment it is often strong, or almost ravenous, probably because, on account of the inordinate quantity of liquid swallowed at the same time, a proportion of the food passes through the stomach imperfectly digested. But very generally where proper treatment is enforced, and not unfrequently even under other circumstances, although the craving for food is considerable, the appetite is easily enough satisfied; and the daily food consumed, though apparently great, compared with what is used by the invalid patients of a hospital, is really not much greater than is required in a state of health. Diabetic patients, when once fairly put upon regular living in hospitals, although their craving for food may have previously been considerable, rarely require more food for appeasing their appetite than what contains between twenty and twenty-eight ounces of real dry nutritive matter; which is fully one-fourth less than what is contained in the navy allowances for seamen. Occasional attacks of dyspepsia are not uncommon throughout the whole course of the disease, and towards the close this affection is often troublesome, and attended even with a failure of appetite.

One of the most important facts relative to the state of the alimentary functions is the late discovery by *Mr. Macgregor*, that sugar is abundantly formed in the stomach by the process of digestion. *Mr. Macgregor* states that he has repeatedly found sugar by the process of fermentation in the contents of the stomach vomited after digestion had begun, and that he has likewise detected it in abundance in the fæces, both by fermentation and by crystallisation. He further adds, that sugar may even be found in the half digested food where no aliment had been taken for some time before, except of an animal nature; that the quantity, however, is much increased under a vegetable diet; and that in some circumstances, he has detected the same principle in the saliva. These are the most valuable and important of all the facts which have been for some years contributed to the pathology of saccharine diabetes; and it is, therefore, much to be desired that their accuracy were put to the test of further observation by others.

Condition of the blood and circulation. In the early stage of diabetes, the circulation is commonly but not invariably in a state of excitement. The pulse is fuller and firmer, sometimes also more frequent than usual, and in general easily excitable; and this state is usually attended with headach and giddiness. Afterwards, as in other diseases, it becomes natural in frequency, softer and weaker, yet still easily excitable. The blood in the early stage occasionally presents more or less of the buffy coat, and the serum is whey-like, owing to the presence of fatty matter, derived probably from absorption of the fat. Subsequently the inflammatory appearance is much more seldom encountered, and the lactescent condition of the serum is likewise less distinct. No particular attention has yet been paid to the condition of the ordinary ingredients of the blood; but it is probable that, as in other chronic diseases, the colouring particles will be found to diminish in proportion as the disease advances. *Dr. Prout* found that the serum is of the average density of 1029·5, and contains the usual proportion of albumen and salts. Great interest has always been attached to the question, whether sugar exists in the blood; and this interest is enhanced by the recent discovery that sugar is formed in the alimentary canal. Most chemical inquirers have failed to detect sugar in the blood of diabetics; but as they have generally sought for it in substance, and the many natural ingredients of the blood obscure and modify its properties, the greater part of their inquiries, in so far as they lead to a negative result, are inconclusive. In recent times, the presence of sugar in the serum was indicated by *Ambrosiani* of Milan, and *Dr. Charles Maitland;* by the former of whom, crystals of pure sugar were separated in small quantity, by a complicated analysis, together with a larger proportion of fermentable, but uncrystallisable syrup. More lately still, these investigations have been confirmed by *Mr. Macgregor*, who, by coagulating and drying the serum, boiling it in water, and concentrating the decoction, obtained a syrupy fluid, which fermented strongly for several hours with yeast. These experiments would appear to put the question at rest. Yet it is probable, that sugar does not exist appreciably in the blood in all circumstances; for in a case where it was examined at the request of the writer by *Dr. Maitland*, although this principle was indicated in some measure by re-agents, it could not be discovered by the only satisfactory inferential method of inquiry,—the process of fermentation. In a more recent case, in the early stage of the disease, the writer could not detect any sugar. In a third, where the disease was far advanced, fermentation indicated its presence only in the small proportion of one grain in eight ounces.

State of the cutaneous functions. The skin in diabetes mellitus is commonly dry, harsh, sometimes rough and disposed to scale, often liable to chilliness, and always with difficulty made to perspire, either by diaphoretic medicines or by exercise. There can be no question that transpiration is exceedingly defective. It is also probable that absorption is unusually active. At all events it is quite plain from what was said above, as to the liquid of the urine often for days together exceeding greatly the fluid part of the food and drink, that water must be freely absorbed, either by the skin or by the pulmonary mucous membrane. The diabetic skin is always most characteristic in the advanced stage of the disease, or where it has been neglected in the early stage, so that the urine possesses the marked diabetic character. When the urine, under judicious treatment, has been brought somewhat towards its natural state, the skin invariably becomes softer and more easily perspirable.

State of the function of nutrition. In all cases nutrition is carried on imperfectly, and always the more so, the more the urine departs from the healthy standard in quality and quantity. Emaciation consequently takes place with considerable rapidity; and it will be found to correspond on the whole in a given time with the excess of solids discharged by the urine over the solids contained in the food and drink. The progress of emaciation is on the whole conformable with the condition of the skin, and is consequently greatest where

the case has been for some time neglected, or is not influenced by treatment. As emaciation advances, the patient's strength is of course gradually much reduced; but there is likewise commonly much languor, weakness, and disinclination to exercise from the very first. The mind is also for the most part affected, the faculty of attention being impaired, and the disposition rendered melancholy, anxious, irritable, and selfish. • No symptom undergoes more marked improvement than the state of the mind under an amelioration in the condition of the urine and skin.

Secondary disorders. As saccharine diabetes commonly lasts for a great length of time, there is room for the incidental occurrence of a considerable variety of diseases. Few of these, however, bear so close or so frequent a connection with the primary disorder as to be entitled to the name of secondary diseases. Peritoneal inflammation has been occasionally remarked in the early stage. In the advanced stage the most frequent of all incidental affections is *tubercular phthisis.* A considerable proportion of the cases that have died for some years past in the Edinburgh Infirmary, have presented tubercles in the lungs, and some have had the characteristic signs of consumption for a long time before death. Another affection, which has been observed too frequently to be altogether accidental in its concurrence, is *granular degeneration* of the kidneys. It was formerly observed, that occasionally the urine in advanced diabetes becomes distinctly albuminous; and in two instances, which have occurred in the Edinburgh hospital, and where an opportunity was presented of examining the body after death, the kidneys were found more or less affected with granular disorganisation of their cortical, or even also in part of their tubular structure. A singularly interesting case of this complication occurred very lately in the person of a man about fifty years of age, who came under the writer's care in June 1838, and was afterwards under the charge of his colleagues, *Dr. Graham* and *Dr. Traill.* He was at this period reduced excessively by diabetes of two years' standing; the urine was about six pints daily, and varied in density between 1045 and 1055·4; the debility was extreme, so as to confine him almost constantly to bed, and his death was therefore looked for daily. In this state he lingered for two months, when the urine began to show a distinct albuminous impregnation, and to fall in density. In the course of four or five weeks more it became natural in point of quantity, strongly albuminous, 1010 in density, and entirely free of sweetness; and in this condition it continued till the middle of February, when the man died in the most extreme state of emaciation, and simply of increasing exhaustion. The writer had an opportunity of examining the urine in January, and found it wholly unfermentable by yeast. On dissection, the kidneys were found larger than natural, and about one-half of their structure was destroyed by granular deposition. Another incidental disorder of not unfrequent occurrence, is *anasarca.* This affection has often been mentioned by authors. It occurs chiefly in advanced cases, and is not improbably connected with granular kidneys. Under any view of its origin it is a singular symptom to be found united with diuresis; for it may occur where the patient is passing eight or ten pints of urine daily. This concurrence, however, is now well known to be a common enough fact in cases of dropsy with granular disease of the kidneys. Anasarca, occurring in diabetes, is commonly difficult to remove, sometimes becomes excessive, and seems occasionally the cause of death. One of the most important of the affections, secondary to diabetes, is sudden fatal sinking, and exhaustion. This affection may occur under any circumstances in the advanced stage, but has been most generally observed in connection with an imprudent attempt on the part of the patient, to deprive himself for a time entirely or nearly of drink. In the advanced stage, the sudden forbearance from gratification of the thirst, if too long persevered in, is extremely apt to be followed by great and sudden reduction of the urine, swiftly increasing debility and faintness, a rapid, weak, fluttering pulse, restless expression of the countenance, and great anxiety. It is seldom found practicable

to rouse the patient from this condition; and death generally follows in the course of a week. This affection is accompanied by sudden diminution of the urine to its natural quantity, restoration to its healthy density, and the disappearance of its sugar. While imminent danger attends any sudden injudicious restriction of the food, it would appear that excessive gratification of the appetite may prove not less hurtful. Sudden death has occasionally been observed soon after a too abundant meal. Apoplexy is a rare incidental affection in diabetes; but, according to *Dr. Prout*, is sometimes the immediate occasion of death.

Pathology, and Anatomical characters. The pathological anatomy and pathology of diabetes are still in a very unsatisfactory state. The kidneys are commonly found larger than in health, more flabby, more gorged with blood, and presenting more numerous and larger vessels, and enlargement of the uriniferous tubuli. The renal arteries and veins are also found at times enlarged. In general, no other morbid appearance is found in the kidneys; but in some cases there is an extensive deposition of greyish-yellow granular matter, invading their cortical and even also their tubular structure. In one instance, an extensive deposition of hydatids has been observed. When an attempt is made to investigate the state of the kidneys by injecting them, it has been merely remarked that the injection flows well, and that the injected vessels are numerous and large. The ureter is sometimes enlarged, generally also the bladder, and occasionally even the urethra; but not unfrequently there is no alteration in any of these organs from the healthy state. On the whole it may be concluded, that so far as anatomical information has yet been obtained, the urinary organs present, for the most part, no further change than what appears to indicate an increased demand merely upon their function. It is perhaps worthy of being added, that in a case which proved fatal in the first year through incidental peritonitis, the writer could find no unnatural appearance whatever in the urinary organs, except some increase of vascularity and of blood in the kidneys. In a few instances the kidneys, instead of being enlarged, are found contracted. Tubercles in the lungs are not uncommon; sometimes they are found softened, and even extensive cavities have been observed. The mesenteric glands have been at times seen considerably enlarged, but this is far from an invariable appearance. The stomach is often quite healthy, sometimes red, or its inner membrane also rough and thickened, as is often seen in old dyspeptic cases; and, not unfrequently, it is much enlarged. The liver, spleen, and pancreas are usually healthy. The intestines do not present any unusual appearance in the generality of cases.

It is plain, therefore, that pathological anatomy throws no positive light on the nature of this strange disease. Nevertheless it enables the pathologist to advance some steps in his inquiries.

In the first place it appears highly probable, from anatomical considerations alone, that the pathological source of diabetes is a functional, and not essentially an organic derangement. At least, no distinct derangement of structure has hitherto been pointed out even in a majority of instances. This conclusion derives no small support from the fact, that urine essentially diabetic will often become essentially natural for a few days before death. It is also supported by an analogous fact, though a solitary one of its kind,—an instance mentioned not long ago in a German journal, where, twice at least, if not thrice, during pregnancy, the patient was suddenly attacked with saccharine diabetes, and as quickly recovered from it after delivery.

When an attempt is made to advance any further in investigating the nature of the disease, the inquirer is lost in the mazes of hypothesis, and harassed by the contradictory sentiments of pathologists. Some will insist, with *Dr. Mason Good*, that nothing else is required, or adequate, to account for the whole phenomena, except some peculiar irritation or functional disturbance of the kidneys. Others have vaguely ascribed the diseased state of the urine to some morbid condition of the blood. Others maintain that suppression of the cuta-

neous secretion is the fundamental derangement in the chain of pathological sequences. Others, and these the most numerous party, insist with great plausibility that the main disorder is derangement of the functions of the stomach. *Dobson*, *Home*, and *Rollo* are among the earliest advocates of this doctrine, which has also constituted a part of the most received theories of the present day, and which has derived a high degree of plausibility from the recent researches of *Mr. Macgregor*. All authors on diabetes agree that the alimentary functions are very often disturbed throughout its course. But if *Mr. Macgregor's* experimental researches be free of error or fallacy, it appears further to be established, that the primary derangement, hitherto ascertainable, is the formation of sugar in the stomach, instead of the ordinary chymous fluid which is free of that principle. *Mr. Macgregor*, as already mentioned, obtained a fermentable fluid from matters vomited not long after a meal, and crystals of sugar from the alvine discharges. He also remarked that the administration of yeast after a meal occasions great distension of the belly, and profuse eructation of gas; and in corroboration of the inference naturally arising from these facts, it may be added, that the further the diet of diabetics is removed from that which contains principles easily convertible into sugar, the less rapid is the progress of the disease, and the more does the urine tend to return towards its healthy constitution. Whether the formation of sugar in the stomach be the only essential and fundamental condition for the development of diabetes, is a question which still remains to be answered, and is one obviously susceptible of experimental elucidation. It seems probable that nothing else is requisite for establishing the disease. There is no physiological reason why sugar formed in the alimentary canal should not be, in some measure, absorbed into the blood; and notwithstanding the negative results of many prior experimentalists, the late researches of *Ambrosiani*, *Maitland*, and *Macgregor* seem adequate to prove that it is positively present. Such being admitted to be the case, no further difficulty would exist in accounting for the peculiar condition of the urine, without the necessity of assuming the concurrence of some peculiar irritation or modification of the renal function. For the greater part of foreign substances admitted into the blood are well-known to be promptly discharged from the body through means of the urine; and diabetic urine might be fairly considered as coming under this category. Formerly, indeed, it was held that sugar not only formed a part of the urine, but likewise displaced the urea; nay, some pains were taken to show how the one principle, from its organic constitution, becomes simply vicarious of the other by a new disposition of elements. But this difficulty vanishes, now that urea has been fully proved to exist at all events in a great majority of diabetics, and invariably in the early stage to an amount not inferior, nay often superior, to what is discharged with healthy urine. The urine of diabetes then, is substantially natural urine, *plus* so much sugar; and hence, if sugar be proved to be formed in the alimentary canal, and to exist in the blood, its discharge by the urine is analogous to the discharge of alkalis, iodine, and other substances through the same medium, when such articles are swallowed, and does not require the supposition of any new or peculiar modification of the renal function. At furthest, the modification is nothing more than an adaptation to the state of the digestive functions and of the blood, and one which, without a doubt, must promptly cease when the blood and the digestive functions return to their healthy condition.

These seem legitimate conclusions from the most recent researches in the chemical pathology of diabetes. They are so interesting, however, and practically so important, that it is very desirable to have the fundamental facts advanced by *Ambrosiani* and *Macgregor* tested by other inquirers and by frequent observation.

It is unnecessary to mention the other doctrines which have been propounded relative to the nature of this disease. They are founded mainly on theoretical

considerations, have never received general currency, and do not lead to any practical deductions of interest.

Causes. Little is known of the causes of diabetes. In general it comes on so gradually, that the patient cannot refer it to any particular cause. Sometimes it is ascribed to exposure to cold, but in vague and general terms. In a few rare cases it has seemed to follow immediately some more definite exposure to cold and wet. It has been supposed to be connected with peculiar kinds of diet or modes of general living; and in this way an explanation is given of its apparent frequency in some countries or districts compared with others. In the first place, however, the relative prevalence of diabetes in various localities is by no means accurately known. Little reliance can be placed upon the vague statements that have gone forth on this subject, such as, that it is more common in Scotland than in England, and in Britain than in France. Accurate statistical inquiries will alone determine the point; for the fallacy of such general assertions seems well enough proved by the late evidence adduced in the writings of *Bardsley* and others, that, contrary to what was at one time conceived, it is not less frequent in the great county hospitals of England, than it has been long known to be in the hospitals of Edinburgh and Glasgow. But further, even granting it were proved to be more common in certain countries and districts than in others, the difference has not been traced hitherto with any plausibility to peculiar modes of living, or kinds of diet. Every statement yet advanced on this head is loose and doubtful. In the observation of the writer, diabetes has presented itself under the most varying and opposite systems of diet. *Dr. Bardsley* found that some of his cases were referrible to the practice of frequently drinking cold water when the body was overheated. In some instances habitual intoxication, combined with frequent exposure, has appeared to be the active cause. There can be no doubt that constitutional circumstances, the result of hereditary tendency, have something to do with the origin of the disease. Various facts of this purport have been stated by *Prout*, *Storer*, *Leigh*, *Thomas*, and others. *Dr. Prout* mentions an instance, where he had an opportunity of ascertaining that four near relatives of his patient had suffered from the disease; and an instance was not long ago mentioned to the writer, where a father and two of his family were affected, and there was reason to believe that at least one, probably two, individuals among his parents and grandparents, had likewise suffered from the same cause.

Prognosis. Very discordant statements have been made by the most trustworthy authors, respecting the mortality and prognosis in cases of diabetes. *Dr. Rollo* was among the first to insist that it might be cured, and has given in his work the whole particulars of a case where the patient seems clearly to have recovered. Since his time several statements have gone forth denying the success of the measures he recommends; very many failures have been announced; few successes can be boasted of; and, upon the whole, the general opinion may be safely assumed to be, that, although life is often much prolonged, and comfort greatly improved by treatment, a cure cannot be accomplished,—and that the disease sooner or later proves fatal.

When a case is neglected, and the patient indulges without restraint in what food and drink he craves, the disease advances with rapidity, and would probably prove fatal in no great number of months. Under proper treatment it is well ascertained that life may be prolonged in general for several years. By many of the best authorities, however, among whom may be specially mentioned *Dr. Prout*, it is distinctly denied that the urine can ever be rendered completely and permanently natural in quantity and composition. In some instances the quantity is reduced to the natural standard, the density falls materially, the sweet taste is no longer observed, and the general symptoms become greatly less urgent. But still, either the urine continues fermentable with yeast, showing that sugar is present, or urea exists in preternatural proportion; in which state the diabetic characters ere long become again more characteristic, and the disease is at length fully re-established in defiance of un-

remitting careful treatment. In this respect the observation of the writer corresponds entirely with that of *Prout* and others. During the last twenty-one years he must have had occasion to know the particulars of at least sixty cases, treated in the Edinburgh Infirmary by himself or his colleagues; but, although some patients gained weight considerably, and had the urine reduced to two pints, to the density of 1030, to its natural colour and odour, and to its proper urinous taste entirely unmingled with sweetness, he has never known an instance of complete cure; in all, the proper diabetic characters of the urine recurred, and the malady ran its usual course.

Very different from these results are the conclusions drawn by *Dr. Bardsley* junior from his experience. For he mentions (*Cyclop.*, i. 536.), that of twenty-nine diabetics he has had under his care, no fewer than eight recovered entirely. Although the statements of the latter author have not hitherto been confirmed by those of any other writer in recent times, still his observations, corroborated by a few successful cases in the hands of prior observers, and by the undoubted temporary benefit derived in most instances from judicious treatment, would appear to warrant the presumption that diabetes ought not to be despondingly considered, according to the practice of many, as an inevitably mortal disease. Recovery must here at least be considered as practicable; and an attempt will now, therefore, be made to lay down the circumstances which point out the chance of recovery as favourable or the reverse. When the disease has lasted for many months, when the patient is greatly emaciated, and broken down in mind as well as in body, when the urine is also very profuse and high in density, when the solids daily discharged by it considerably exceed the solids in the daily food, the chance even of amendment is small and recovery is impracticable. The most favourable cases are those where the disease does not exceed a few months in duration, where the urine, under moderate care in diet and regimen, does not ever exceed twelve pints in quantity and 1036 in density, where the emaciation is not very great, nor the appetite ravenous, nor the mind much depressed, nor the skin exceedingly dry and scaly. The favourable signs under methodical treatment are, that the urine quickly begins to sink in quantity without rising in density; that the daily discharge of solids by this excretion undergoes a steady diminution; that the emaciation is succeeded by a progressive increase of weight; that the appetite, and eventually also the thirst, are gradually lessened; and that the skin becomes softer, the eye brighter, the mind clearer and more cheerful, and the body active and stronger. A cure ought never to be considered as complete, unless for some weeks together the urine has been in every respect natural, and the patient is quickly regaining his natural weight; and the urine is not to be viewed as natural, unless it has its usual pale wine-yellow colour and urinous odour, does not ferment with yeast at a temperature of 70°, and contains little more than two ounces and a quarter of solid matter daily. The last character is a better criterion than its mere quantity or density, or even both taken together; but is of course to be determined from the density and quantity as data, according to the method already mentioned.

Among the signs indicating the approach of death, may be mentioned the accession of pectoral complaints, and the decided appearance of albumen in the urine,—symptoms which the patient seldom survives many months. Incidental inflammatory diseases are apt to be unusually fatal. The worst sign of all is sudden and great prostration. When this occurs, even during a state of tolerable strength and activity, it is apt to lead speedily to a fatal issue; and it is almost always fatal in a few days, if it supervenes upon a rash attempt to reduce abruptly the allowance of drink.

Treatment. The treatment of diabetes is now well understood; and physicians are pretty well agreed as to its principles, though in practice they differ somewhat. It consists essentially in the employment of bloodletting, animal diet, opium, astringents, and the diaphoretic regimen.

Bloodletting forms more or less a part of the treatment employed by a

great majority of practitioners in the present day; but it is now generally held to be serviceable only in the early stage, not in all cases even at this period, and only when used in moderation. By one eminent authority, *Dr. Watt*, bloodletting was pushed to a much greater extent, resorted to more indiscriminately, and elevated to a higher station among remedies. For he held that, mainly by the frequent abstraction of blood, for the purpose of reducing the quantity and stimulating quality of the circulating fluid, and by promoting this object by low diet, local remedies, and mercury, a cure might be brought about, not merely in the early stage, but likewise even where the disease had made great progress, and where the pulse had in consequence become feeble, as well as the general strength much impaired. In some rare cases these flattering commendations of *Watt's* treatment have apparently been realised by succeeding practitioners; but all the cases of alleged recovery, described by him and his imitators, are open to the objection that, at the time they were made public, practitioners were not aware of the exact conditions required for proving a cure, and that in all probability the urine continued essentially diabetic although much improved. No one at least has been able to obtain the same results from the treatment by venesection in later years, since the lurking characters of the disease in such circumstances have been investigated and made known. And at present the employment of bloodletting is considered advisable only in the beginning, when the pulse is full and firm, if not also frequent, the anxiety and restlessness unusually great, and the skin inclined to become hot and always exceedingly dry. In this state of matters moderate bloodletting is found of signal service in allaying excitement and irritability; the attainment of which object is also for the most part attended with marked improvement in the quantity and nature of the urine.

Dr. Francis Home was the first to point out the advantages of an animal diet in the treatment of diabetes. But the dietetic treatment was not reduced to a regular system, or its effects thoroughly understood till the publication of the interesting treatise of *Dr. Rollo*. This author illustrated the beneficial effects of animal diet by a variety of cases, in one of which a complete and apparently permanent recovery was accomplished; and since his time, a diet more or less purely animal has constituted an essential part of every successful method of cure. *Dr. Rollo* dwelt strongly on the necessity of enforcing for some time a strictly animal diet, into which no article of vegetable food was to be admitted. It has been found, however, exceedingly difficult to secure the observance of an absolute animal diet even in private practice, and still more in hospitals; and in recent times it has even been maintained that the rigorous observance of such a diet is not essential, and that some articles of vegetable food, more especially bread, may be safely allowed in moderate proportion. The difficulty of enforcing a rigorous animal diet must be readily conceded: the craving for vegetable aliments soon becomes overpowering, particularly where the patient is tantalised by the sight of others indulging in them without control. But some doubt may be entertained whether the rigour of *Rollo's* dietetic system can be relaxed at all without prejudice, even although several eminent authorities, and among the rest *Dr. Prout*, have decided the question in the affirmative. It is at least not unworthy of remark, that those who allow a moderate proportion of vegetable aliment admit their practice to have been unsuccessful; while others, who maintain with *Dr. Bardsley* that a fair proportion of cases may be cured, have adopted in their practice a rigorous animal diet, and insist, like *Rollo*, that they who deny from their own experience the curability of the disease, had forfeited all claim to do so from having permitted a departure from his injunctions in this respect.

It is universally conceded that if vegetable food is to be allowed at all, bread is the only admissible article; that it should be fermented bread, and somewhat stale. Among animal articles the flesh of adult animals is preferable to others; it ought to be cooked in preference by broiling or roasting, and with as little salt as possible lest thirst be excited; it should be taken three times a day at most,

the largest meal being that of dinner; and the last meal must be taken at least two or three hours before bedtime. In the middle walks of society a greater variety of articles and modes of cooking is advisable, otherwise an animal diet soon becomes irksome; but in admitting variety in these respects, digestibility is always an important condition. *Rollo* and some of his imitators have thought that there is advantage in the meat being as fat as possible, because it is less digestible than in its ordinary state. But the reason for this preference is far from conclusive, and experience has not confirmed the statement, that much fat tends to restore the healthy constitution of the urine. Others again have thought that cheese may form a moderate proportion of the food, on the ground that in a state of health it is comparatively indigestible, superabundant in azote, and highly productive of urea and lithic acid. Here too ulterior experience contradicts early theory. The stomach being apt in many cases to be easily disordered, indigestible substances ought not to be preferred; as the urine generally abounds in urea, food producing this principle in abundance is not eligible; and in point of fact cheese, even where well digested, does not appear to possess any advantages over muscular fibre. It ought not therefore to constitute a large proportion of the food as some propose, but may be allowed in small quantity for variety's sake, wherever it is found easily digestible. The quantity of the food should be carefully regulated. It was remarked above, that exaggerated notions are often entertained of the quantity of food which diabetics consume, and that in general, though they have unusual appetite and craving before meals, they will be satisfied with even less than the allowances of a stout man engaged in an active employment. If bread is allowed, sixteen ounces of that article, and twenty ounces of meat (weighed raw) will generally prove sufficient; or it will become so in no long time if the morbid condition of the urine should begin to yield to treatment.

As thirst is commonly a more urgent symptom than hunger, so is it likewise more difficult to control. The regulation of the drink is, however, one of the most essential articles of the treatment. For it must be observed that excessive indulgence in liquids is on the one hand injurious by impairing digestion, or even causing some of the food to pass into the intestines undigested; and on the other it has a much worse effect upon the urine than merely increasing its quantity by simple dilution, since the density is commonly found to be maintained, though the quantity be greatly increased. The patient must accordingly be often exhorted to curb the longing for drink as much as possible and great care should be taken in regulating its quality. It is found that thirst is slaked with a less amount of fluids when a considerable proportion of the drink consists of such animal infusions as weak beef tea or mutton tea, to which may also be added milk in moderation. Except these articles, pure spring-water, and probably also such waters as contain calcareous salts in excess, no other ordinary articles of drink are allowable. The water of Bristol Hot-well and other calcareous springs, has been found by *Dr. Marsh*, *Dr. Prout*, and others, to be less apt to increase the quantity of urine than ordinary waters. Beer and other fermented liquors, much as they are longed for by the patient,—also wine and spirits, which he often asks for on account of the sense of languor and oppression that assail him,—tea as being in some measure diuretic, and all acidulous drinks, must be carefully shunned. An important rule is, that he should drink little at a time. Another rule not less essential is, that little liquid should be taken at meals, and the thirst controlled as long after meals as possible; because under these precautions digestion goes on more perfectly, and thirst subsequently is less difficult to appease. Advantage has been found by some in using all the drink warm, because less is required to slake the thirst. While it is desirable that the desire for drink should at all times be controlled as much as may be conveniently accomplished, great and sudden reductions, for reasons formerly given, ought never to be attempted, especially when the disease is somewhat advanced.

It is of imperative consequence that violations of system as to diet be scru-

pulously avoided. The undue gratification of the thirst, the indulgence in such prohibited articles as beer, spirits, vegetables, pastry or confectioneries, is infallibly followed by an increase in the quantity and density of the urine, when it has been reduced in these respects by previous care in eating and drinking; and one stolen enjoyment is dearly purchased by many days of aggravated thirst and exasperation of every symptom.

Some have been inclined to trust the treatment of diabetes to animal diet almost alone. More generally opium has been considered an important adjunct, and it would seem to be indicated by the anxiety, peevishness, and general irritability of the system, which prevail in most cases, and invariably where the disease has been for some time neglected. The regular administration of opium in the dose of a grain twice or thrice a day, and gradually increased so as to keep up a calmative and gently hypnotic action, constitutes a part of the most successful methods of treatment which are followed in the present day; and in particular it forms an essential part of the method by which *Dr. Bardsley* junior attained the extraordinary success formerly alluded to. Where opium is thus given habitually, its constipating effect on the bowels must of course be counteracted by laxatives; which besides are often called for by a natural tendency existing to constipation.

Astringents have been admitted as part of the treatment of diabetes from a very ancient date; but their utility is doubtful, and their administration proceeds upon a false theory, if the disordered state of the function of the kidneys be a secondary affection, as seems not improbable. Till recent times vegetable astringents were made use of; but of late such mineral astringents as sulphate of zinc and acetate of lead have been preferred, and the latter constitutes one of the means now generally considered most efficacious.

The restoration of the functions of the skin to their natural condition has been a favourite object with many physicians, and is admitted by all to be of no little consequence. It may be questioned, however, whether the administration of medicines internally for this purpose be a judicious measure, or at least whether any other internal diaphoretic be advisable, except the opium, which is administered primarily for another object. Some give the opium in the form of Dover's powder. It is probably preferable to give the opium simply, and to trust the restoration of the cutaneous excretion to friction, warm clothing, and the warm bath. The last article of regimen is usually most grateful to the patient, and when used in moderation in the evening is followed by refreshing sleep, sometimes gentle perspiration, and also not unfrequently by comparative freedom from micturition during the night. The employment of antimonial sudorifics, which has been advocated by some, and especially by *Dr. Marsh*, has never come into general credit.

Besides the fundamental treatment now described, various subsidiary or incidental measures require brief mention. The concurrence of dyspeptic symptoms may render it necessary to administer magnesia as an antacid and the aromatic bitters as tonics. Pain in the epigastrium, sometimes a troublesome affection, is often best relieved by a few leeches. The supervention of œdema is to be met by sudorifics or the purgative method. Pulmonary affections must be combated by calmative expectorants and local bleeding or blisters. The occurrence of great debility and exhaustion may render the employment of wine and other stimulants unavoidable. But this class of remedies ought not to be resorted to so long as any chance of recovery seems to remain.

It would serve no useful purpose to examine into the merits of the farrago of heterogeneous remedies which have been proposed by various authors more or less as specifics in diabetes. The mere enumeration of them will be sufficient. Some have trusted to local treatment by leeches, blisters, and issues applied to the loins. Others have proposed alkalis, especially ammonia; some on the contrary prefer acids; and some magnesia. Tonics, among which cinchona chiefly figures, were at one time rather fashionable. Mercury has been considered an important remedy, by those chiefly however who look upon it as

a remedy for almost every thing. Iron has had its supporters also. Even diuretics have had their day with some. Among the many new remedies which modern chemical discovery has introduced into the Pharmacopœia, iodine was for some time thought a sovereign remedy. And more lately creosote was vehemently extolled as constituting at length the specific which had been long unsuccessfully sought for. It would be unfair to deny that some of these modes of cure have appeared occasionally of service. But as they have commonly been conjoined with an animal regimen, there is no evidence whatever of any of them possessing a specific virtue. Neither have they been hitherto found so frequently successful as to induce any great reliance upon them even as subsidiary measures in the treatment.

DIABETES CHYLOSUS.

Symptoms.—Nature.—Treatment.

UNDER the name of chylous urine, *Dr. Prout* first gave an accurate description of a peculiar diseased condition of this fluid, where it is discharged of a milky appearance, and contains principles analogous, if not identical, with those of chyle. *Dr. Willis*, waiving the question of its relations to chyle, denominates it oleo-albuminous urine, and *Dr. Venables* classes it with the various forms of diabetes under the specific name of Diuresis chylosa.

This is a rare disease, even *Dr. Prout* having only had nine cases brought more or less directly under his notice. Several detached examples of it, however, have been made public since *Dr. Prout's* work on urinary disorders appeared, so that some notice of it is required in the present place. It sometimes exists without any derangement of the health, at other times with some degree of languor and reduction of flesh, sometimes again with lumbar pains, much emaciation, strong appetite, and much thirst, so as to bear a close resemblance in its general characters to saccharine diabetes. The urine is for the most part abundant in quantity; sometimes, however, natural in that respect, of a milky appearance, and varying in density from 1010 to 1020 in the generality of cases. After it has been discharged for a short time it sometimes coagulates into a gelatinous body like blanc-mange, and afterwards gradually separates into a clear yellowish fluid and a white clot; at other times a white flaky matter is deposited without general coagulation of the mass; and in other cases again, a white homogeneous substance is thrown up to the surface like cream. The matter which separates in all these shapes appears to differ somewhat from albumen, to approach to fibrin or caseïn in its characters, and to contain some oleaginous or fatty matter which may be easily removed by sulphuric ether. In all of these properties it bears a resemblance to the white coagulum of chyle; which it has accordingly been supposed to be. The entire fluid is sometimes coagulable by heat, sometimes not, always coagulable by acids, and easily decomposed by keeping. The clear fluid, after separation of the coagulum, sometimes coagulates by heat, and yields a precipitate with solution of ferrocyanide of potassium, acidulated with acetic acid; by which property it is distinguished from true albuminous urine. Occasionally the white coagulum contains in its substance some of the colouring particles of the blood. The urea is always very defective, but never altogether wanting. The peculiarities of this kind of urine are usually best marked a few hours after a meal. They are apt to be removed for the time by inflammatory action, or by ptyalism from mercurials.

This singular condition of the urine has been observed sometimes to occur only at intervals, and is then attended with the general symptoms mentioned above. In other cases it has seemed permanent, at least has been traced for five or even for twelve continuous years; and it is then generally so little apt to give rise to constitutional derangement, that the individual, as in a case mentioned by *Mr. Abernethy*, may even become corpulent, or may bear

children without apparent injury, as in one of the instances described by *Dr. Prout.* It has been met with in both sexes, and before puberty, as well as in early manhood, middle life, and old age. A considerable proportion of cases have occurred in the instance of individuals who had been a good deal in hot climates. Its causes are exceedingly obscure. Luxurious living, exposure to cold, extreme fatigue, and the constitutional action of mercury, have been the chief apparent causes mentioned by the reporters of cases. It appears to be common in Brazil.

The *nature* of the disease is not well determined. The majority of authors have referred it to the passage of chyle into the urine, and therefore suppose that a portion of the chyle does not undergo the final stage of the process of sanguification on being thrown into the bloodvessels; that the blood becomes chylous; and that the morbid ingredients are thrown off by the kidneys, like many other foreign matters. Plausible as this view may seem, it has not yet received that support from observation which will alone establish it: no one has yet proved that the blood is chylous. The condition of the urine is certainly very like that of the blood in cases of milky serum, where a modified albumen and a great abundance of fatty matter are present; but, strange to say, although blood has been several times drawn in the disease, no one has hitherto taken any notice of its appearance or properties. In the account of a case described by *Dr. Graves*, the coagulable matter is said to have been caseïn; which, if correct and of general occurrence, would lead to a different view of the nature of the affection. But the secretion of cheesy matter with the urine in any circumstance is a very doubtful fact.

In the only cases where a fatal termination has been observed, death arose incidentally from acute internal inflammation; and no morbid appearance was discovered in the kidneys.

Chylous diabetes seldom calls for any particular *treatment.* When there is constitutional disturbance, it has been found useful to withdraw blood from the arm, to enjoin sparing living, to promote the functions of the skin, and to administer anodynes and regular laxatives, among which the resinous kind probably are the most appropriate. Tonics do not answer well. Where the disease is habitual and without constitutional disturbance, it ought not to be interfered with. At all events no means of removing it are known.

SUPPRESSION OF URINE

Symptomatic of various diseases.—Symptoms.—Causes.—Treatment.

By suppression of urine, the *Ischuria renalis* of most nosographists, and more aptly designated by *Dr. Willis*, *Anuria*, is understood the diminution or complete arrestment of the secretion of urine. Although usually considered by practitioners and described in systematic works as a disease, it is probably in correct language a mere symptom of various diseases. It occurs as a symptom in some cases of acute as well as chronic nephritis, in the acute and chronic forms of granular deposition into the substance of the kidneys, as well as in atrophy and other chronic renal diseases. It also occurs as a symptom of certain forms of poisoning, probably in connection with inflammation. Doubts exist whether it is also presented as a mere functional disorder. In compliance with custom, suppression will be here shortly described as an express disease.

The urine may, for a time or permanently, be much reduced below the daily average of thirty-five or forty ounces, formerly assigned as the average of health, without any ill consequence resulting. A temporary diminution to only six or eight ounces daily is common enough in febrile diseases, without

any peculiar symptoms being observed to follow. Even in a state of health an unusually dry diet, especially conjoined with much exercise, and likewise certain obscure constitutional peculiarities, may occasion a very material reduction, but still, as in the former case, without any evident inconvenience. We even sometimes see a permanent decrease far below the natural standard occasioned by constitutional circumstances alone without any injurious effects. The writer lately met with the case of a youth of seventeen years of age, who for two years before had passed never more than six ounces, and for the most part only four ounces daily; yet, except several attacks of loss of appetite and consequent languor and weakness, of short standing, he suffered no inconvenience. In some diseased states of the system the same immunity from any peculiar symptoms has been remarked, where the urine was almost entirely suppressed for many days together. As to the alleged cases, where the secretion of urine appeared to have been suspended for weeks, months, or even years, in persons enjoying tolerable health, or at all events not subject to any affections referrible to inaction of the kidneys, they may be all safely put down to the account of imposition.

Admitting that exceptions occasionally occur, there can be no doubt of the general fact, that extreme diminution or complete suspension of the flow of urine is usually followed by very serious symptoms, and generally by death at no great distance of time. The symptoms vary with the circumstances under which the suppression takes place, and probably with its causes; which however are not yet all thoroughly understood. When suppression takes place suddenly from any cause during a state of health, or in any other circumstance except a pre-existing state of protracted chronic disease, the usual results are the following:—At first little or no uneasiness of any kind is occasioned; but ere long there is languor, restlessness, vague general discomfort, a sense of weight, weariness, and sometimes pain in the loins and lower extremities, upon which the attention is probably for the first time called to an excessive diminution or total suspension of the urine. The pulse then commonly becomes excited, and sometimes regular fever is formed, with heat of skin, flushed features, headach, nausea, and vomiting; but these symptoms are not constant. So far the case presents a resemblance to the early stage of continued fever; for which the disease is at first not unfrequently mistaken. At length drowsiness comes on, generally in the course of the third day; and about the same period, or sooner, puffiness of the features is observed, or at times distinct œdema of the limbs or body generally, sometimes pitting on pressure, more frequently elastic. The drowsiness gradually passes on to coma, which is usually formed on the fourth day; and death ensues, either within three days more, and without any additional symptom, or at an early period of the coma with a precursory stage of convulsions. When the bladder is examined with the catheter, which is commonly done from curiosity, or to guard against the possibility of mere retention of urine existing, the instrument brings away at the commencement only a few drachms of muddy urine, loaded with mucus, commonly pale, low in density, and often strongly coagulable by heat as well as nitric acid. At a later period the bladder is generally found quite empty.

When suppression of urine takes place suddenly during the prevalence of chronic diseases, the symptoms are for the most part identical with those just described. But if the flow of urine fall gradually, it is sometimes observed that the quantity may be reduced to one or two ounces daily of a fluid containing not above a third of the ordinary proportion of solids, and nevertheless without the patient presenting for many days any of the consequences usually expected from so great a suppression. Such is not unfrequently found to be the case in the advanced stage of granular degeneration of the kidneys. The symptoms which at length appear are those of unmixed coma, without fever or any excitement of the circulation at all, and likewise without distinct convulsions; and death creeps on by degrees from increasing stupor, very much as in poisoning with opium, but more slowly; or the fatal event is occasioned

by some accessary affection prevailing at the time the suppression was induced.

Another remarkable circumstance in which suppression of urine may take place with very different phenomena, is in connexion with the effects of certain poisons. Complete suppression has been observed in cases of acute poisoning with large doses of foxglove, corrosive sublimate, and cantharides. But here the kidneys are evidently in a state of violent irritation, as appears both from the lumbar pain, strangury, and often bloody urine at the commencement, and from the redness, softening, gorging, and occasionally even suppuration, which are found in their substance after death. All cases of this kind, hitherto recorded, seem to have proved fatal from the accessary effects of the poison on the alimentary canal or nervous system, at a period too soon for the development of the constitutional symptoms proper to suppression.

In such cases the suppression of urine is probably not a functional disorder, but merely one of the secondary effects of inflammation. It is well known at least, on the one hand, that these poisons produce nephritis, and on the other that nephritis, if acute, whatsoever its cause, whether exposure to cold, a blow upon the loins, or irritation of the kidneys arising from diseases of the prostate, bladder, and uterus, or from calculi in the kidneys, or from calculi or other obstructions in the ureters, is often attended with complete arrestment of the urinary secretion.

There is still another variety of suppression worthy of distinct mention, on account of the peculiar circumstances in which it has been witnessed, namely, a form lately described by a German author, *Schönlein*, and likewise shortly noticed by *Dr. Willis* as a disorder that has occasionally come under his observation. Sometimes in young children the flow of urine is diminished to a very great degree, or almost entirely suspended, so that only a few drops are passed from time to time and with difficulty; and this state is accompanied with a febrile state of the general system, pain in the region of the bladder, scalding of the urethra and external parts over which the urine dribbles, constipation and scybalous fæces, an acetous odour of the breath, and a tendency to pustular eruptions and intertrigo of the cuticular folds. If not arrested, the disease ends in exhaustion and coma. A similar disorder has been observed in elderly persons, especially in connexion with lithic gravel. *Dr. Willis* infers from his experience, that this variety of suppression occurs chiefly as the sequela of confirmed diseases of the digestive organs or nervous system; and it may be safely added, that many cases of the kind are in all probability nothing else than the concluding stage of chronic derangements of the structure of the kidneys, especially granular degeneration and atrophy, to which the most manifest affections, those of digestion and of the nervous system, are merely secondary.

The *causes* of suppression of urine are various and not yet well understood; but the researches of *Dr. Bright* and his followers have done a great deal towards elucidating the subject, by pointing out that suppression is very often closely connected with pre-existing organic disease in the kidneys. The immediate exciting cause has sometimes been a blow, producing concussion of the parts adjacent to the kidneys, at other times general exposure of the body, or exposure of the lower part of the trunk to cold and wet, and in some instances the action of poisons taken inwardly. In such cases suppression appears to be commonly induced secondarily through the intervention of acute nephritis. But more generally it is difficult to fix upon any probable extraneous cause; and it is only after an examination of the dead body, or under an exact acquaintance with the varying characters assumed during life by chronic renal diseases, that the true relations of the most prominent disorder, the suppression of urine, become intelligible. If the writer may judge from his own observation, suppression occurs very seldom except in the course of acute and chronic organic diseases of the kidneys.

The morbid appearances in acute anuria, or sudden suppression without

obvious pre-existing disease, are darkness, flabbiness, brittleness, and congestion of the kidneys, sometimes with enlargement, especially of their cortical portion, contraction and emptiness of the bladder, and impregnation of the blood with urea, which may also be detected in the blood drawn during life. In suppression connected with the action of poisons, unequivocal marks of inflammation are sometimes found, namely redness of the lining membrane of the pelvis, and calyces of the kidneys, purulent matter in the tubuli, which may be squeezed out of the papillæ, and occasionally even a collection of pus in the pelvis. In the chronic form of anuria, which occurs suddenly or gradually in the progress of chronic diseases, it is usual to find the kidneys very much altered in their structure, and their healthy organisation in a great measure destroyed. Probably various organic diseases of the kidney may terminate in suppression of urine; but those most frequently found in connexion with it are the several forms of disease which have been classed under the general head of granular degeneration. There is strong reason for suspecting that some cases of acute anuria are likewise connected with the same disorder, the suppression arising in the early stage of that functional derangement which gives occasion to albuminous urine and granular deposition. Other cases of acute anuria are rather referrible to the acute form of simple nephritis. In some instances the apparent renal affection causing suppression has been the presence of one or more calculi in the kidneys, or one of the ureters. But judging from the descriptions of published cases of this nature, it is not improbable that other chronic disorders of structure concurred. This was clearly the case in one of the cases quoted by *Dr. Willis.*

The *treatment* of suppression of urine differs with the circumstances in which the disease arises. In most cases it is fatal, and not even to be interrupted in its progress by any method of cure, especially when the suppression is complete, or nearly so. When the urine is merely much diminished, as in many instances of chronic organic diseases of the kidneys, diuretics, among which digitalis and bitartrate of potash are the most active, will sometimes restore the natural quantity of urine, and avert danger for a time. But when the urine is reduced to a few drachms in the twenty-four hours, or is altogether suspended, recovery is exceedingly rare. In cases occurring without previous organic disease, the most efficacious remedies are free bloodletting, anodynes combined with diaphoretics, such as Dover's powder, the warm-bath, purgatives, together with frequent brisk purgative injections; to which some add, though with questionable propriety, blisters to the loins and diuretics. In cases where the kidneys have been long diseased, blood should be withdrawn sparingly, because it is always very thin, watery, and unusually defective in colouring globules, so that the constitution cannot safely bear further loss. Purgatives and diuretics are here the most advisable remedies, and blisters too are sometimes of service. For the most part however, when the urine has become nearly suppressed in long-continued organic diseases of the kidneys, no remedial measures will restore its quantity; and if once drowsiness has fairly set in, the case is all but hopeless. In the coma, which constitutes the final stage of suppression, no remedies are of much avail; bloodletting, which may seem indicated by the state of the circulation, does no good, and sometimes evidently accelerates death.

ORGANIC DISEASES OF THE KIDNEYS.

Few organs in the body are subject to so great a variety of morbid alterations of structure as the kidney. Most of them, however, are of rare occurrence; and those which are frequent have been discovered to be so only within a few years. Hence the knowledge at present possessed of their anatomical characters, and still more of their external signs during life is in many particulars imperfect.

To *Dr. Bright* peculiarly belongs the honour of pointing out a few years ago the frequency with which the kidneys undergo changes in their organic structure, as well as the important part performed by these structural changes in the development of several common and fatal disorders. More recently the entire subject of renal diseases has been taken up by *M. Rayer**; whose investigations, not yet concluded, promise to throw much additional light upon the rarer organic affections.

The general result of these and other inquiries is, that the kidneys are more or less liable to all the alterations of structure which are observed in the great viscera generally, and to certain peculiar affections which bear reference to their peculiar functions. They are subject to inflammation, chronic and acute, parenchymatous and membranous; and they also present hypertrophy and atrophy of their proper structure,—congestion and anæmia,—tubercular, granular, cartilaginous, and carcinomatous deposition and degeneration,—serous cysts, osseous cysts, urinary cysts, and general distension from obstruction to the escape of urine,—together with displacement, anomalous conformation, and deficiency of a kidney. Of the pathological conditions now enumerated, two only are so frequent as to require full investigation here,—namely, inflammation and granular deposition. As for the rest, besides being rare, they are rather objects of anatomical interest than of practical importance; for the signs by which they may be detected during life are equivocal, and in their very nature they are little amenable to treatment.

The whole subject of organic diseases of the kidney may be conveniently treated in a practical work like the present under the following heads:—1. *Errors of position* or *conformation*; 2. *Hypertrophy*; 3. *Inflammation*; 4. *Granular deposition*; 5. *Hyperæmia*; 6. *Anæmia*; 7. *Atrophy*; 8. *Tubercles*; 9. *Carcinoma*; 10. *Hydronephrosis*; 11. *Serous cysts.*

ERRORS IN POSITION AND CONFORMATION.

INSTEAD of being situated in the lumbar region, one of the kidneys is sometimes placed in the iliac fossa or pelvis. *Rayer* says he has detected this malformation during life, both by remarking the tumour in the iliac fossa, and likewise by feeling that the kidney was absent from its usual place, on making the patient lean forward on his knees and shoulders in bed, and then grasping the loins. Sometimes the two kidneys are connected together by renal structure across the spine, constituting what is aptly called the horse-shoe kidney. More frequently one kidney is altogether wanting. This malformation is probably not so common as has been generally thought, because excessive atrophy of the kidney has been sometimes mistaken for the total absence of the organ. When absent, the ureter is commonly wanting also; but sometimes, as in a case lately examined by the writer, the ureter is present and terminates in the usual region by simple occlusion of its tube. Deficiency of a kidney may be sometimes ascertained presumptively by the method of examination just described as proposed by *M. Rayer*. Malposition, malformation, or deficiency of the kidney, does not give rise to any disturbance of the renal functions or to any inconvenience. These deviations from the ordinary rule are therefore mere anatomical curiosities. When one kidney is wanting, its place is always supplied by unusual size or hypertrophy of the other.

HYPERTROPHY OF THE KIDNEYS.

THE case just mentioned is the clearest example of simple hypertrophy of the kidney; the organ is simply enlarged in all its parts. In other circumstances, however, both kidneys are affected with hypertrophy in conjunction

* Traité des Maladies des Reins,

with other morbid states. Thus, in cases of saccharine diabetes, it is not uncommon to find the kidneys considerably enlarged, and their proper structure unusually developed. But there is always in that case congestion also, which in part accounts for the apparent development. Again, in that state of the kidneys which many pathologists regard as the first stage of the acute form of granular deposition, it is usual to find the kidneys enlarged, and the tubular as well as cortical structures unnaturally developed. But here, too, congestion is constantly present, and likewise frequently some degree of granular deposit, by which the development of the cortical structure in particular is to appearance much increased, though the augmentation may really be inconsiderable. Little is known of the relations of renal hypertrophy to symptoms. Most probably it either gives rise to no peculiar symptoms, or, as in diabetes, it is consecutive not primary, and nothing else than the result of an increased demand upon the renal functions. That it has nothing to do with the development of diabetes is plain from the fact, that it is far from being invariably met with in that disease, even where of long standing.

INFLAMMATION OF THE KIDNEYS.

Frequency of the disease.—Various forms according to Rayer.—Symptoms of acute nephritis—Of simple chronic nephritis.—Complications.—Symptoms and terminations of Pyelitis.—Causes of the several forms of inflammation of the kidneys.—Anatomical characters.—Prognosis.—Treatment.

Inflammation of the kidneys has been commonly thought to be a rather rare disease; but if the late investigations of *M. Rayer* be correct, and all the affections he has included under the head of inflammation belong to that category, it would appear to be one of the most frequent of all organic disorders. Doubts may be justly entertained, whether the use he has made of the term inflammation be not too comprehensive; but, at the same time, there can be little question that inflammation of the kidneys has been proved by him to be much more common than has hitherto been almost universally thought. In particular, it appears often to concur with other diseases either of the urinary organs or elsewhere, by whose symptoms it is obscured during life, and by whose appearances after death the attention of the pathologist is apt to be led away from it.

Inflammation may attack each of the principal textures of the kidney either separately or conjunctly; and in each case it may put on a variety of forms as regards both its anatomical characters and its external signs. *M. Rayer* has distinguished no fewer than four diseases according to the texture involved, namely *Nephritis*, or inflammation of the gland itself; *Pyelitis*, inflammation of the pelvis and calyces; *Perinephritis*, inflammation of its investing fibrous membrane; and *Pyelonephritis*, where both the pelvis and glandular structure are affected. Of nephritis he admits no fewer than four different species:—*Simple*, of which there is both an acute and chronic form; *Arthritic*, comprising the peculiarities which occur in connexion with gout and rheumatism; *Albuminous*, under which designation is comprehended the granular alteration of the kidneys of *Dr. Bright*; and *Nephritis from morbid poisons*, such as attends typhoid fever, small-pox, and other infectious or malignant febrile diseases. Of pyelitis *M. Rayer* also makes four species, *simple*, *gonorrhœal*, *calculous*, and *verminous*: which differ from one another chiefly in their causes. All these species and modifications of disease, he maintains, are to be distinguished as well by anatomical characters as by their history, and their special symptoms during life. In the following statements it is impracticable to do full justice to his views, or to follow his arrangement, because the text intended to illustrate his pathological delineations is hitherto only in part published. An attempt, however, will be made to introduce the most material part of what has already

appeared under one general head of Inflammation of the Kidneys. All that relates to granular deposition will come better under a separate head; for the connexion of that disease with inflammation has not been established.

Symptoms. The symptoms of inflammation of the kidneys differ considerably according to the acuteness of the disease, the texture attacked, and the cause which produces it.

1. *Simple acute Nephritis.* This form of the disease commonly sets in, like other acute inflammations, with an attack of rigors, often very severe, followed soon by sickness, heat of skin, frequency of the pulse, and other symptoms of fever. At the same time there is pain in one or both loins, deep-seated, at times circumscribed, more generally affecting the whole lumbar region and flank, not pulsating, occasionally acute, more frequently dull, sometimes felt only upon pressure in the region of the kidney, always aggravated by firm pressure, and likewise by the sitting posture, bending forward, coughing, sneezing, or other strong efforts of respiration, and even sometimes by the descent of the diaphragm in ordinary breathing. The lumbar pain is particularly acute in the arthritic variety of the disease. The pain is not always confined to the lumbar region; but more commonly it shoots down the course of the ureters to the neck of the bladder, the groins, or the scrotum, and it is frequently attended with retraction of the testicles. When the patient is made to lie in bed upon his face, with the knees drawn up under the abdomen, the kidney may sometimes be felt by grasping the flank with one hand or between both hands; in which case it is found to be tender, and occasionally too enlarged. The urine is either suppressed altogether, or more commonly it is very scanty, and passed either seldom, or on the contrary, very often, and with straining and severe pain. The fluid discharged is usually at first bloody, that is, either attended with considerable hæmaturia, or more often tinted merely of a cherry-red or brown colour, and coagulable with heat and acids. Afterwards the blood disappears, and the urine is pale, almost aqueous, without albumen, and hence not coagulable by heat, no longer acid, but either neutral or even alkaline, especially where the bladder or prostate is also affected, or where the inflammatory action in the kidney tends to the chronic form. Albumen is sometimes present, although there is no impregnation of blood, so that the urine coagulates with heat as in cases of granular degeneration. This is particularly observed, according to *Rayer*, in the rheumatic form of nephritis. But where the albuminous impregnation is considerable, granular deposition probably always concurs. Lithic acid and the lithates are usually defective in their proportion; in the arthritic variety alone of nephritis are they, on the contrary, superabundant, so as to come away in the form of sandy or earthy gravel, or to be deposited in these forms as the urine cools; and in correspondence with this state, the urine, instead of being pale and neutral or alkaline, is acid and often high-coloured. In pure nephritis it does not contain either mucus or pus. But as the disease seldom continues long, without being attended with inflammation of the pelvis, ureters, or bladder, it is in fact usual to observe first mucus, and then purulent matter passing with the urine.

The ordinary constitutional symptoms, besides the simple phenomena of general re-action, are a foul, greatly loaded, white tongue; distressing nausea, and frequent vomiting, generally of a muco-bilious matter, which at times possesses a somewhat urinous odour; constipation, tympanitic distension of the abdomen, and wandering pains in the intestines; together with an anxious countenance and much depression.

Ere long further symptoms arise, which are connected with the several modes of termination of the disease. Sometimes indeed the inflammation terminates in resolution, without any new symptoms. At other times it would appear to terminate in partial induration of the inflamed kidney. In that case there are either no symptoms afterwards, but simply the phenomena of resolution; or, where the extent of injury produced is great, obscure indications of chronic organic disease may ensue, leading generally to chronic nephritis. The

most remarkable termination of the disease is in apoplectic coma. This is very apt to occur where the urine is long greatly dimininished or altogether suppressed. Drowsiness then comes on, which gradually ends in deep coma, occasionally intermingled with convulsions; and death usually ensues within three or four days after the first appearance of cerebral symptoms. Allied to this mode of termination are another set of cases where typhoid symptoms appear at an early period, — namely, prostration of strength, torpor of the senses and mental faculties, frequent rigors, a black incrustation of the tongue and teeth, together with an absence of pain except on pressure in the loins, and the involuntary discharge of a little urine at distant intervals. Such cases too end in coma. Another mode of termination is in suppuration. This is indicated, though obscurely, by rigors followed by hectic fever, but not necessarily, as some imagine, by the appearance of purulent matter in the urine, — which is rare indeed, except where the pelvis, or membranes of other urinary organs, are also inflamed. Suppuration sometimes leads eventually to renal fistulæ, which may communicate either with the cellular tissue of the lumbar muscles, causing abscess there and even an external opening on the integuments; or with the liver, exciting hepatic abscess; or with the peritoneal cavity, giving rise to fatal acute peritonitis; or with the colon or duodenum, through means of which the contents of the renal abscess are discharged by the rectum. Renal fistulæ however, with these their several results, are extremely rare, except where pyelitis, or inflammation of the pelvis, is united with inflammation of the proper renal structure. Gangrene is a still more rare termination of nephritis. It is rare in any circumstances, and chiefly occurs where the pelvis is inflamed as well as the secreting structure. It is most frequently observed in the pyelo-nephritis, which terminates calculus of the kidney or bladder, or which follows the operation of lithotomy. Its occurrence is indicated by sudden remission of pain, a feeble fluttering pulse, constant vomiting and hiccup, anxiety, delirium, complete suppression or a scanty discharge of brown fetid urine; sometimes too by petechiæ on the skin, and the other symptoms of malignant typhus. Among the terminations of acute nephritis must also be mentioned chronic inflammation, the symptoms of which may be next considered.

2. *Simple chronic Nephritis*, like most chronic inflammations of internal viscera, in general begins obscurely. At the commencement, indeed, it scarcely presents any appreciable signs. Even throughout its whole course it may escape the practitioner's notice, unless it be combined, as commonly happens sooner or later, with inflammation of the pelvis of the kidney, or unless the attention be turned to the state of the urine.

Pain in the region of the kidney is seldom complained of, but nevertheless is generally admitted by the patient to be present if he is questioned respecting it. The pain is confined to one or both lumbar regions, and does not shoot downwards to the thigh or testicle, as in acute nephritis. It is aggravated, or, if otherwise wanting, it may be excited, by firm pressure over the kidneys. Often the only proof of increased sensibility of the kidney is, that pressure causes more uneasiness at one side of the spine than at the other. The urine is diminished in quantity, yet is passed more frequently than natural. In the early stage it is feebly acid or neutral; and when the disease is fully formed, it becomes alkaline, and at the same time more or less turbid. The turbidity is owing to the separation of amorphous sediments, which consist at times of phosphate of lime only, more rarely of nothing else but the ammoniaco-magnesian phosphate, but most generally of a mixture of both salts, or of these together with some lithate of ammonia. There is seldom any well-marked fever, but great and progressive exhaustion and emaciation.

The most important of the symptoms of chronic nephritis is the alkaline and turbid state of the urine. This is considered by *M. Rayer* so characteristic in certain circumstances that in all cases of wasting from obscure and apparently constitutional causes, he recommends that the kidneys should be made the object of careful attention wherever the urine is alkaline. Alkaline urine may

be connected with diseased spine, diseased bladder or prostate, and even, perhaps, with constitutional cachexies. But, from his experience, he is inclined to believe that chronic nephritis, either singly, or concurring with these diseases, is one of its most frequent sources. Where a doubt arises, whether chronic inflammation of the kidney be present or not, some light is occasionally thrown upon the question by observing the effect of local depletion or counter-stimulants in diminishing the alkalinity of the urine, or even removing it for a time altogether. The urine in chronic nephritis very seldom contains any blood or albumen, unless other renal diseases concur. It often presents mucus in considerable quantity, but never purulent matter, unless where inflammation of the pelvis, of the kidney, or of the mucous coat of the bladder be present as a complication

The terminations of chronic nephritis are not yet throroughly understood. Sometimes it passes into the acute form of the disease; sometimes it is followed by inflammation of the pelvis of the kidney and suppuration, as indicated by the appearance first of mucus, and then of purulent matter in the urine; probably it ends sometimes in resolution, or in partial induration, which does not interfere with the right discharge of the renal functions afterwards; and in other cases it terminates in extensive induration, cartilaginous degeneration, or atrophy, and may then, in *M. Rayer's* opinion, give rise to coma, chronic vomiting, simple exhaustion, diarrhœa, and other fatal affections, which have been hitherto considered to be connected only with granular deposition. It is not improbable that some of the cases, where these affections have been described by British authors as terminating granular disease with contraction and atrophy of the kidney, have been really the terminations of what *M. Rayer* has considered to be nothing else than simple chronic inflammation.

The *complications* of acute and chronic nephritis constitute a very essential part of their history. On the one hand, neither affection often exists long without leading to other important diseases, both of the urinary organs and elsewhere; and on the other hand, diseases of various organs in the body are more or less apt to induce renal inflammation. In consequence of the complications thus arising, nephritis frequently remains concealed from observation, and is accordingly thought a more rare disease than it is in reality.

The following sketch of these complications is taken chiefly from the elaborate treatise of *M. Rayer*. It will anticipate in part what might be stated under the subsequent head of the causes of nephritis. The most common complications are diseases of the genito-urinary organs. As already mentioned, chronic inflammation of the substance of the kidney frequently becomes complicated in its course with acute inflammation. Each of these is very apt to follow and complicate acute or chronic inflammation of the pelvis of the kidney, in which case the urine is first mucous or purulent, and then becomes pale and scanty, or altogether suppressed, while the muco-purulent impregnation continues. They may also become complicated with inflammation of the investing renal membrane in the course of formation of renal fistulæ; but the symptoms of this incident are obscure. Nephritis may further follow and complicate almost any chronic organic disease of the kidney, such as dilatation from retention of urine or hydronephrosis of some pathologists, tubercles, serous cysts, and cancer, the last of which in particular is often terminated by the symptoms of acute inflammation. A more rare conjunction is inflammation of the ureter, arising commonly from obstruction of the flow of urine by an impacted calculus, or a tumour, or spontaneous contraction of its canal. The affection of the ureter is here always the prior in point of time; so that the symptoms of nephritis are preceded by pain along the course of the ureter, instead of the pain affecting the lumbar region in the first instance. One of the most frequent of all complications is inflammation of the bladder, in consequence of stone, or of the operation of lithotomy or lithotrity. *M. Rayer* insists strongly on the frequency of this conjunction in such circumstances, and on the tendency of surgeons to overlook the existence of nephritis both in preparing their patients before operating for stone, and in treating the sequelæ of the operation. Their attention is natu-

rally turned to the more prominent symptoms of irritation and inflammation of the bladder; so that they lose sight of a concurring disease, the arrestment of which is not less essential for the patient's safety. He adds that the presence of nephritis may be known by the urine becoming alkaline, which he maintains never to take place so long as the inflammatory action is confined to the bladder. This would be a highly valuable means of diagnosis, did the general fact stand exactly as he alleges. But further observation is required to establish a statement so much opposed to the present opinions of the surgical part of the profession; for inflammation of the bladder is generally considered to render of itself the urine alkaline, where it follows calculus. Another disease of the bladder, occasionally complicated with nephritis, is cancer. Cancer of the bladder, if it do not prove fatal by constitutional exhaustion, through frequent hæmorrhage or constant irritation, generally terminates by inducing inflammation of the kidney; and this appears for the most part to be excited by the malignant tumour obstructing the aperture of the ureter, and so causing retention of urine. Nephritis may likewise be conjoined with diseased prostate, in consequence of the latter occasioning retention of urine, one of the most common immediate causes of the development of inflammatory action in the kidney. It may likewise concur with gonorrhœa, to which indeed it is related in various ways. Its conjunction with acute gonorrhœa, which however is very rare, is presented, when the discharge of an unusually violent gonorrhœa is arrested by the injudicious use of powerful internal stimulants or strong astringent injections. It is more frequently produced in the chronic stage of gonorrhœa, and is then commonly observed to arise from exposure to cold and wet as its direct cause. The symptoms of its production are, first a sense of great irritation in the bladder, then pain in the region of the kidneys, frequent discharge of pale urine, speedily becoming mucous and scanty, and attended with straining and distressing spasms, sometimes involuntary discharge of seminal fluid, and commonly a sense of heat and weight in the perineum. Gonorrhœa may farther produce nephritis, through the medium of stricture of the urethra. But besides, any cause may produce it which occasions obstruction of that canal, such as a calculus impacted in it, or an external tumour or foreign body pressing upon it; and in almost all cases of the kind the inflammation of the kidney is preceded by inflammation of the bladder. Diseases of the uterus are apt, sooner or later, to become complicated with nephritis. It is observed often enough in cancer, or in cartilaginous tumours of the uterus, even sometimes in prolapsus, nay, occasionally in pregnancy, especially where many children have been previously borne. It is right that obstetrical practitioners should be aware of this fact, and that the lumbar pains so frequently observed from compression of the abdominal viscera by the uterus, or dragging of the parts adjacent, may really at times depend on so different and so serious a cause. When nephritis complicates pregnancy, it may occasion miscarriage, or difficult and painful labour, or death in childbed, by favouring various important sequelæ. Inflammation of the kidney sometimes is attended with inflammation of the testicles, and at other times with atrophy of these organs.

Nephritis may also be complicated with diseases in other organs besides those belonging to the genito-urinary apparatus. The inflammation occasionally spreads to the liver and duodenum from the right kidney, or to the spleen and colon from that of the left side; and in such circumstances renal fistulæ are sometimes formed, particularly fistulæ opening into the intestinal canal. On the other hand hepatitis has sometimes seemed to lead to nephritis, instead of the latter preceding the former; and the same complication and order of occurrences has been remarked in respect of carcinoma of the liver. Chronic peritonitis is another disease of adjacent parts, which sometimes leads to inflammation of the kidney; the symptoms of which however are always obscure, so that it is seldom discovered till on dissection after death. Some other visceral inflammations at a greater distance occasionally present a similar connexion. For example, pleurisy and pneumonia sometimes occur during nephritis, and in-

versely nephritis may be developed during the prevalence of one or another of the pulmonary inflammations. The latter case is marked by the urine, from acid, becoming alkaline; the former by the converse. Peritonitis, pleurisy, and pneumonia are much more frequent as incidental diseases in what *M. Rayer* calls albuminous nephritis, that is granular disease of the kidneys, than in any of the forms of simple nephritis. Affections of the spinal cord are not unfrequently followed by renal inflammation. It has been long observed, that injuries of the spinal chord, producing paralysis and retention, are commonly attended with an alkaline and turbid state of the urine. This has been usually ascribed either to the urine undergoing decay during prolonged exposure to heat in the bladder, or to some modification of the renal function produced directly by the morbid condition of the spinal chord. *M. Rayer* has satisfied himself that the former explanation is inadequate to account for the phenomenon, because the urine does not decay when retained in the bladder in other circumstances; and he is inclined to think, that an alkaline state of the urine depends on renal irritation, tending to inflammatory action, and that, when it occurs after injuries of the spine, it should always direct the attention of the surgeon to the state of the kidneys. Inflammation of the spinal chord in like manner sometimes leads to nephritis; and so does paraplegia, by inducing retention; in which circumstances therefore alkalescence of the urine ought always to put the physician on his guard. Diseases of the brain may be the indirect cause of nephritis, by inducing paraplegia and retention of urine. A much more important source of such complication, is the tendency of nephritis to terminate in coma and apoplexy, probably through poisoning of the blood by urea and the other ingredients of the urine which are not excreted as usual. The termination of simple nephritis in coma has already been alluded to as an occasional occurrence; but it will be seen afterwards under the head of GRANULAR DISEASE OF THE KIDNEY, that, if this affection is to be considered with *M. Rayer* as a species of inflammation, coma, convulsions, and apoplexy are among the most common of the complications of nephritis, and may indeed be correctly said to be in the natural course of the disease as one of its modes of termination. Among the diseases during which nephritis may arise as an intercurrent affection typhoid fever must be enumerated, together with all febrile diseases which are apt to be attended with typhus, such as variola, yellow fever, purulent absorptions, the *pustule maligne* produced by inoculation from the flesh of diseased cattle, and the like. In all such circumstances latent nephritis would appear to be far from so uncommon as was thought before the late inquiries of *M. Rayer*. The disease is latent, because the functions of external relation are oppressed, and likewise because alkalinity of the urine, one of the best signs in general for leading to its detection, is here fallacious, since this state probably occurs merely from functional causes connected with the typhoid state. Nephritis, arising in typhoid diseases, is sometimes nothing else than the consequence of neglected retention of urine; but in other cases the exact relation between the local and general disorder is not apparent. Certain cutaneous diseases seem in some measure connected with chronic nephritis. It was formerly observed that gravel and calculus lead to the development of scaly and papular diseases of the skin; so that, as nephritis may originate in calculus, the apparent connexion between it and cutaneous disorders is in some measure accounted for. But besides, there is little doubt that nephritis generally may lead to certain cutaneous eruptions, such as eczema, either general, or confined to the genital organs, and also pemphigus. Dropsical effusion, especially anasarca, has been considered one of the diseases incidental to nephritis; but *M. Rayer* distinctly denies that it is ever produced during the simple form of the disease, or in any other variety except the granular disorder of the kidneys, which he denominates albuminous nephritis.

3. The symptoms of inflammation of the pelvis of the kidney, the *Pyelitis* of *M. Rayer*, will, it is hoped, be much elucidated by the forthcoming volume of that pathologist's researches. Meanwhile it may be sufficient to mention that

there is both a chronic and an acute form of the disease; that it presents other varieties, which have led *M. Rayer* to distinguish a *simple*, a *calculous*, a *gonorrhœal*, and a *gangrenous* pyelitis; that its tendency is to end in suppuration and commonly also distension of the pelvis and calyces of the kidney; and that most of its symptoms resemble considerably those of nephritis, with the single exception of the properties of the urine. The pain more frequently extends to the testicles and is attended with retraction of them, than where the structure of the kidney itself is alone inflamed. When in the progress of the disease, suppuration and distension of the pelvis or entire kidney have taken place, the enlargement of the organ may be more frequently ascertained by manual examination; and when the tumour is very large, fluctuation may even be detected. Hectic fever too is for the most part better marked than in suppuration of the substance of the kidney. The urine is not so greatly reduced in quantity, and never suppressed; but there are frequent and urgent calls to pass it; and from an early period it presents an admixture of ropy mucus, which ere long gives place in some measure to pus. The presence of mucus and pus, together with the negative evidence of the absence of disease in other urinary organs, is the best character of pyelitis for distinguishing it from nephritis.

It may terminate in resolution, suppuration, gangrene, and inflammation of the kidney itself. The second and the last are the most frequent modes of termination. Matter may accumulate without necessarily occasioning distension; but more generally the pelvis first expands, and then dilatation of the calyces follows; at length the substance of the kidney likewise stretches out, as it were, and at the same time loses its healthy structure by atrophy; and thus occasionally an enormous pouch is formed which is full of pus. Sometimes, when the inflammation is propagated outwards, it passes to adjacent organs, to which the purulent sac adheres; and renal fistula is gradually formed. The fistula may communicate with the various organs in the neighbourhood, such as the liver, spleen, duodenum, colon, diaphragm and lungs, and the adjoining external integuments, thus producing a variety of superadded symptoms, which it is unnecessary to enumerate. Pyelitis seldom exists long without being complicated with nephritis. Where the two affections concur, the former is generally prior in point of time. It is also often complicated with inflammation of the bladder, and it may occur with any of the other disorders of the urinary organs, which were formerly mentioned as being apt to complicate inflammation of the parenchyma of the kidney.

Causes. The causes of the several species and forms of inflammation of the kidneys and their membranes are various. They may be produced by external injuries, such as blows on the loins, concussion of the body affecting that quarter in particular, and penetrating wounds of the kidney. Exposure to cold and wet has the same influence in exciting inflammation there as in other internal organs. Drinking freely of cold water, especially when the body is overheated, has several times been observed to have the same effect. One of its most unequivocal causes is the specific influence of certain irritating poisons on the kidneys. Cantharides has long been considered one of the most powerful poisons of this kind. According to *Rayer*, it would appear to act fully more upon the bladder and urethra when it is taken internally; but nevertheless little doubt can exist that the kidneys may likewise be affected by it, both when swallowed in poisonous doses, and in particular constitutions when applied outwardly in the form of blister. Oil of turpentine has also been known to excite symptoms like those of nephritis, but more rarely; and a still more rare agent of the same nature is nitre. Corrosive sublimate and other corrosive salts of mercury, when administered in poisonous doses, act in the same manner with considerable certainty, producing bloody urine, strangury, or at times suppression, and leaving in the dead body signs of increased action in the kidneys. Digitalis seems another poison possessing similar properties, with whose effects however we are less acquainted. The abuse of alcoholic fluids, especially strong spirits, has been held to be another cause; but

it rather acts by exciting a predisposition than as a direct agent; and, in this country at least, it more frequently occasions granular disease than true inflammatory action. By much the most frequent cause is the pre-existence of other diseases of the urinary organs. This subject has been already anticipated, in what was stated above as to the complications of simple nephritis; but a brief recapitulation may be here advisable. The co-existence of other diseases of the urinary organs may induce renal inflammation in three ways. They may act in the first place as direct sources of irritation; as for example, where the kidneys contain calculi in their substance or their pelvis, or where they are affected with tubercles, cysts, cancerous degeneration, and the like, or where they have been injured by external violence. Since, however, calculi, cysts, tubercles, and cancer may exist for a long time in many without leading to inflammation, it would appear that some more direct exciting cause must co-operate; and probably exposure to cold, internal stimulants, or, in the case of calculi, sudden succussions of the body, are the chief co-operating agents. In the second place, other diseases of the urinary organs may act by transmission of the inflammatory action along a continuous membranous surface, if not by sympathy of the different parts of the same continuous membrane. This seems the usual way in which violent gonorrhœa in a few rare cases, and inflammation of the bladder much more frequently, excite nephritis or pyelitis. Lastly, various diseases of the urinary organs lead indirectly to renal inflammation, by obstructing the discharge of urine, and in consequence occasioning distension and irritation of the kidney. These diseases are a calculus obstructing one of the infundibula; obstruction of the ureter by a calculus or tumour, or tubercles, or spontaneous contraction of its canal; obstruction of its orifice by morbid growths in the bladder, or paralysis and distension of the bladder; obstruction of the urethra by a calculus, by stricture, by diseased prostate, by a foreign body introduced from without, or by foreign bodies or tumours pressing upon it externally. In all these cases accumulation of urine takes place, distension of the pelvis and calyces of the kidney ensues, and renal inflammation almost certainly follows, if the patient do not previously die of some more immediate disorder. Other diseases besides those of the urinary organs may more or less directly excite nephritis. These it is unnecessary to enumerate, as they were mentioned already among its complications. The most important of them are diseases of the spine, which appear to act both indirectly by inducing paralysis of the bladder with its consequences, and directly in some obscure way on the renal functions. The relations of age to inflammation of the kidney are important. It occurs occasionally in infants, very rarely between infancy and puberty, seldom also between puberty and middle age, and most frequently after that period. All these facts are easily referrible to the comparative frequency at different ages of the other urinary affections, which either directly excite nephritis and pyelitis, or predispose to them. Peculiarities of constitution predispose to nephritis in a remarkable manner. It is peculiarly frequent, comparatively speaking, in gouty habits, and in those subject to gravel and calculus.

Anatomical characters. A very complete view of the pathological appearances in inflammation of the kidney has been given in the delineations and treatise of *M. Rayer*; whose description may be adopted in the following abstract.

In simple acute nephritis, and in the early stage, there are found gorging, and redness or brownness, sometimes partial, often general, affecting chiefly the cortical structure both externally, and where it dips between the tubuli,—enlargement of the bloodvessels of the cortical texture, red points from injection, and sometimes true ecchymosed patches; occasionally some induration of both textures, especially the tubular part, in which case the general redness is mottled with pale, bloodless patches, and the external surface of the organ is rugous or botryoidal. There is generally more or less swelling of the kidney, and at times to so great an amount that it weighs four times the

healthy standard, or about seventeen ounces. Where the tubular structure is much affected, the infundibula are sometimes much enlarged, so that the papillæ equal in size that of the nipple. Purulent deposits are frequently seen, oftener in the cortical than in the tubular structure, sometimes very minute, like grains of sand, and situated near the surface, sometimes in very appreciable masses, as big even as peas, very rarely in larger abscesses. What have been described by authors as large abscesses of the kidney have been cases of pyelitis leading to suppuration and distension, either of the pelvis or of one or more calyces. The purulent deposits are surrounded always by a dark-red circle. Sometimes instead of purulent deposits there is general softening of the cortical texture with purulent infiltration, where the pus is discoverable only by scraping the cut surface with the scalpel. Ulceration of the papillæ is occasionally met with. A rare appearance is gangrenous softening, indicated by lividity of the kidney, fever, and such a degree of disintegration that the texture is here and there broken up into tomentous masses by merely washing it. Imbedded calculi are not uncommon.

In simple chronic nephritis the kidney is commonly found diminished, seldom enlarged, usually somewhat hardened, occasionally almost cartilaginous, on its surface granular, rugous, or botryoidal, generally pale and anæmious both externally and internally, but sometimes with red mottling, probably from superinduced acute inflammation. The cortical portion is for the most part chiefly affected. Sometimes this part of the renal structure is atrophied, so that the tubuli approach one another, as well as the external surface of the kidney; and, in consequence, the surface of the organ is botryoidal or lobulated, the investing membrane firmly adherent, and sometimes the papillæ much elongated. Both chronic and acute nephritis are occasionally found to affect both kidneys.

In acute pyelitis in its early stage, the mucous membrane of the pelvis and calyces is found vascular, with red spots of ecchymosis, occasionally blood extravasated upon its inner surface, and sometimes lymph thrown out in patches so as to obstruct the ureter. At a more advanced stage there is frequently more or less dilatation of the pelvis and calyces, where retention of urine was the exciting cause; and occasionally the membrane is softened, ulcerated, or even perforated, where the cause was the presence of a calculus, or where the inflammation, whatsoever its cause, had passed on to gangrene. The urine contained in the pelvis and calyces commonly contains blood and pus, not always discoverable by the naked eye, but visible enough with the help of the microscope. It also sometimes contains amorphous sediments of lithate of ammonia, crystallised lithic acid, crystalline phosphate of magnesia and ammonia, and likewise albumen.

In chronic pyelitis the membrane is dull white, its vessels large and varicose, but without a minute vascular network; the external veins on the kidney are large; the pelvis and calyces are distended in many cases, and then the membrane is thickened, without visible vessels, and the ureter much contracted, sometimes reduced to a mere fibrous cord. The inner surface of the membrane sometimes presents a reddish-brown tint, or this mottled with slate-coloured patches; at other times transparent vesicles, like sudamina, are seen on its surface; and occasionally there are ulcerations corresponding with the pressure produced by the edges and points of calculi. In some cases the ulceration penetrates the membrane, forming urinary fistulæ, which communicate with the subperitoneal cellular tissue, the peritoneal cavity, the liver, the spleen, the colon, the duodenum, or the lungs through the diaphragm. All the phenomena of pyelitis now mentioned may be presented without dilatation of the pelvis. More commonly the pelvis and calyces are much dilated, especially in cases depending on obstruction of urine; and at times the kidney itself becomes dilated and at the same time atrophied, so that a great multilocular membranous pouch is formed, filled with purulent urine, or nearly pure pus, or a mixture

of pus, urine, and blood, and frequently containing one or more calculi, or in rare instances acephalocysts, or several strongyli.

Perinephritis, or inflammation of the investing membrane of the kidney, is seldom observed alone, but occasionally in conjunction with inflammation of the kidney itself. It appears in the form of redness and purulent infiltration of the cellular tissue, connecting the membrane and kidney, sometimes with effusion of blood, sometimes with deposition of coagulable lymph in layers. In a few instances the membrane adheres to the peritoneum in the loins; and then it may be found ulcerated, and producing purulent infiltration of the lumbar cellular tissue; or an abscess is formed there, pointing outwards.

Prognosis. The prognosis in inflammation of the kidney depends mainly on the causes and circumstances which give rise to it. That which arises in the course of other urinary diseases is always unfavourable; and when it commences suddenly during some severe chronic disease, such as enlarged prostate, cancer of the bladder, or after the operation of lithotomy or lithotrity, it is generally fatal. Not less unfavourable, for the most part, are those cases which occur in the course of diseases in other organs, such as the liver, lungs, spinal chord or brain. Those which depend upon calculus in the kidney are more frequently arrested, yet are still formidable; and they are commonly fatal if the calculus is lodged in the ureter or bladder in such a way as to cause stoppage of the flow of urine. Nephritis and pyelitis, produced by exposure to cold, or by injuries of the kidneys, are the least unfavourable of all the varieties. Cases attended with suppression of urine, with coma, or with excessive prostration and other typhoid symptoms, are seldom cured. The occasional recurrence of rigors, followed by increase of fever, is an unfavourable sign, inasmuch as it shows continuance and renewal of inflammatory action. Alkalinity of the urine, for the like reason, is upon the whole unpropitious. The termination of the disease in suppuration is indicated, as in other inflammations, by rigors succeeded by hectic fever, and is likewise an unfavourable, though by no means a fatal circumstance. The favourable signs are the converse of what have just been enumerated; and the most promising circumstances are where no irremediable organic disease pre-exists, and where the urine is neutral or slightly acid, and not tending towards suppression.

Treatment. The treatment does not differ essentially from that of other inflammations. When the disease is acute, blood must immediately be taken from the arm in proportion to the patient's age, constitution, and freedom from exhaustion by prior disease. Little good is done unless faintness be induced. It may be necessary to repeat the venesection again and again, just as in pneumonia or peritonitis; and the repetition of it may either be delayed till its necessity is pointed out by the renewal of the symptoms, in which case free evacuation will again be required; or, which is better practice, a few ounces of blood may be drawn at intervals of five or six hours, without waiting for aggravation of the symptoms. The disease, however, may sometimes be arrested at once, and with much less loss of blood, by following up the first evacuation with a full opiate. For the efficacy of this practice it is essential that venesection be pushed so far as to induce faintness and subdue pain, and that the opiate be given in a full dose of two or three grains of opium, or thirty or forty minims of the tincture, immediately after the faintness passes off. The writer has seen the disease abruptly arrested in this way. Leeches, or cupping to the loins, may be of service after the severity of the inflammation has been subdued by general bloodletting, or in cases where that remedy cannot be resorted to; and they are of frequent service where the inflammation is chronic, more especially in its early stage. The warm bath, the warm hip-bath, and warm fomentations of the loins, have been generally recommended by authors on this subject; but they sometimes do harm, unless the violence of the inflammation be subdued in the first place by more active means. In chronic inflammation, and after the partial subsidence of acute inflammation, the most effectual treatment consists in the use of counter-stimulants applied to the lum-

bar region, among which the most approved are setons, caustic issues, and the actual cautery. Blisters are generally avoided, on account of the risk of their exerting their peculiar action upon the kidneys and bladder in special constitutions; but there seems no good reason for shunning them, where previous experience may show that the constitution is not of the kind in which they act injuriously.

Anodynes should generally be employed from an early period. The force of the circulation, however, should first be subdued; but after that, pain must be relieved, either as already mentioned by a full opiate administered immediately, or by less doses given according to circumstances. Some prefer hyoscyamus to opium, perhaps without sufficient reason. Where opium must be given frequently, or where it fails to give relief when administered by the mouth, it is often signally useful in the form of clyster or suppository. Some, not without reason, prefer this mode of using opium in all circumstances. Chronic inflammation may be relieved by opiate plaisters, friction, or fomentation; but these modes of using anodynes are inapplicable to the acute form of the disease, at least in its early stage. The combination of calomel and opium, so familiarly employed in other acute inflammations, has not been much resorted to in this species, but may be presumed nevertheless to be admissible. The same remark might be applicable to tartar-emetic in nauseating antiphlogistic doses, were it not that there is generally a great tendency to vomiting in the several forms of renal inflammation.

It is needless to observe that in the acute form the diet and regimen must be strictly antiphlogistic. When the acute stage is passed, small quantities of nutritive but easily digestible food may be allowed. In chronic inflammation *M. Rayer* has satisfied himself that a diet moderately animal is better than one purely vegetable; and in all circumstances, except those of acute inflammation, milk is an important article. Complete repose is indispensable in the acute stage and form; and even in the chronic form, or in recovery from the acute, exercise should be long avoided, and practised with caution and in moderation, because it is apt to renew or increase the morbid action. The urine, for instance, when rendered neutral or acid in chronic nephritis, has become speedily alkaline after indiscreet exercise, showing that irritation was renewed.

Certain special symptoms have to be combated. Great importance has been attached to the restoration or increase of the secretion of urine. This is undoubtedly an object of great consequence; but it is to be attained only by subduing inflammation with its own proper remedies, not by the use of diuretic medicines. It is advisable to administer mucilaginous diluents in the acute stage; but diuretics are of no use, and may increase the irritation. In the chronic stage there is not the same objection to them, provided the stimulant species be avoided. Free dilution is sometimes sufficient; but if not, digitalis among vegetable diuretics, and bitartrate of potass among those of the saline class, are the most appropriate. Strangury and frequent micturition are best subdued in general by the treatment already laid down for more general and fundamental purposes, especially by opiates after bloodletting. Opiate clysters, opiate frictions over the perineum, emollient injections into the urethra, and the warm hip-bath may also be resorted to as occasionally serviceable. Few symptoms occasion so great distress as the incessant sickness and frequent vomiting which attend most cases of acute inflammation, and even many instances of the chronic form of the disease. They may sometimes be subdued by small doses of solid opium, by hydrocyanic acid, creosote, or small quantities of ice-cold water, but in general these remedies are merely palliative, frequently they fail altogether, and the practitioner must trust for the removal of vomiting to the fundamental treatment. In chronic nephritis it is probable that creosote may prove a more efficient remedy than in acute inflammation of the kidney; at least its good effects are often shown in vomiting connected with other organic diseases, and among the rest with granular degeneration.

The treatment must of course be directed, not merely to the inflammation of

the kidney, but likewise to the disease, if any, which seems to have excited it. Where calculus is present, or the urine presents gravelly deposits, such treatment must be added as the particular variety of calculus or gravel demands. If lithic acid, or the lithates, abound in the urine, the alkaline carbonates should be given, and turpentine and the balsams are sometimes serviceable; if the earthy phosphates constitute the deposit, either acidulous drinks may be administered, or alkalis may be allowed in the form of soda-water or kali-water. It should be remembered that the urine may contain earthy phosphates, although there be no calculus anywhere, and even no previous tendency to phosphatic gravel; for in the advanced stage of acute, and throughout the whole course of chronic nephritis, the urine is alkaline and loaded more or less with amorphous phosphatic deposits.

It is desirable to correct this condition of the urine, if possible. It cannot be accomplished, however, by acids. The aërated alkaline bicarbonates are more likely to be serviceable. But the surest remedy is the treatment of the fundamental disease, which occasions alkalinity, that is the antiphlogistic treatment of the renal irritation. It is unnecessary to take notice here of the treatment applicable to the other urinary diseases, which may cause or complicate nephritis. One subject only may be alluded to. Wherever retention of urine has been the immediate exciting cause, or is in any way complicated with inflammation of the kidney, the urine must be withdrawn by the catheter; and it is better to use the instrument at stated periods, than to leave it constantly in the bladder, as at one time was the common practice. Where retention is occasioned by a calculus impacted in the ureter, its discharge must be promoted by the moderate use of diluents, the administration of opium in the form of clyster, and the warm bath. Art, however, can accomplish little in this case.

GRANULAR DISEASE OF THE KIDNEY.

Recent discovery of this form of renal disease. — Definition. — Primary symptoms of the acute and chronic form. — Characters of the urine. — State of the blood. — Secondary diseases. — Causes. — Prognosis. — Anatomical characters and pathology. — Treatment of the primary disease. — Of the secondary affections.

Dr. Bright * was the first who clearly pointed out, in 1827, the frequent connexion of anasarca and other dropsical affections, with a peculiar disease of the kidneys, the leading character of which is the deposition of a yellowish granular matter in its substance, together with the gradual atrophy of its cortical and tubular structure. There never, perhaps, was an important pathological discovery, which in so short a period has been confirmed by so great a number of extensive inquiries. Nevertheless, many unaccountably entertain grave doubts of the truth even of the fundamental discovery, and still more of some of the most material pathological details. The general result, however, of the researches of *Dr. Bright*, and of those which have been since made successively by the writer, by *Dr. Gregory*, *Dr. Osborne*, *M. Solon*, *M. Rayer*, *and* many other contributors on a less extensive scale, is that granular degeneration of the kidneys is one of the most common of organic disorders; that it is intimately connected with a great variety of both chronic and acute diseases, which it either exasperates as a complication, or favours by establishing a predisposition; and that, although often obscure in its characters, it may almost always be successfully recognised if skilfully sought for. It is possible, indeed, that those who have specially attached themselves to the investigation of the subject, may have allowed themselves occasionally too extensive a range, and included under the general head of granular disease other organic renal disorders, which may be distinguished from it on further inquiry. But

* Reports of Medical Cases, 1827.

this proposition, though admitted, will not affect, at least in any material degree, the validity of the important general conclusions here laid down.

This disease may be defined as a morbid deposit in the substance of the kidney, generally in a granular form, occasioning atrophy of the proper renal structure, and indicated by more or less tendency to diminution of the solids of the urine, generally also by the presence of albumen, and frequently by the supervention of dropsical effusions.*

Symptoms. The symptoms of granular disease of the kidney are partly those which properly belong to the primary disorder, and are more or less essential to it, and partly those which denote the presence of secondary affections. To the former class may be assigned the symptoms of local uneasiness, those of disordered digestion, a morbid state of the urine, a diseased condition of the blood, and leucophlegmatia. To the latter belong the symptoms of œdematous effusion into the cellular tissue, serous effusion into the sacs of the pleura, pericardium, and peritoneum, inflammation of the serous membranes, bronchitis, diarrhœa, rheumatism, and apoplectic or epileptic coma.

The primary symptoms, which will first be considered, vary materially at the commencement, according as the disease breaks forth suddenly, or develops itself slowly and insidiously; but after a time they become more uniform.

When it commences in the acute form, the usual symptoms are rigor, ushering in an attack of inflammatory fever, of more or less severity; scantiness of the urine, which is indeed sometimes almost suppressed, always highly albuminous, occasionally bloody, and often passed frequently and with difficulty; lumbar pain, rarely acute, more generally dull, and occasionally, though seldom, shooting to the groins or testicles; pain across the pit of the stomach, felt only on pressure, or increased by it, and attended with nausea, and often with vomiting. These symptoms seldom exist long without anasarca being formed; frequently this affection appears in the course of the first or second day; and it commonly puts on the characters of inflammatory dropsy. The subsequent course of the disease is exceedingly various. Sometimes it is checked by active treatment. Sometimes it proves quickly fatal by the development of some acute visceral inflammation, such as pleurisy, pericarditis, peritonitis, or pneumonia. Frequently it ends in coma, which occurs chiefly in the cases where the urine is greatly reduced in quantity, and which almost always terminates fatally. Most generally the acute symptoms give place to those of the chronic form of the disease, which then runs its own proper course.

Several of the symptoms now enumerated, as those of its acute form, are sometimes wanting. The only invariable character is scanty, highly coagulable urine, with more or less fever. These symptoms may prevail alone for a few days, till coma and convulsions suddenly occur and prove quickly fatal. Hence the disease is not unfrequently misunderstood at first, where it presents itself in such a shape; and it may even continue to escape notice till the examination of the dead body explains its nature. It is altogether a mistake to suppose with *M. Rayer* and some others, that dropsy is an invariable attendant of this or any other form of granular disease of the kidneys.

The chronic form may commence with acute symptoms, which after a time pass off. More generally it commences obscurely and most insidiously, often indeed without any appreciable symptom at all that attracts the patient's attention for months, except perhaps frequency of micturition and slowly increasing debility. If an examination happen to be made at this time, however, it will be found that there are occasionally obscure pains in the loins, increased by pressure, and either a scanty, or on the contrary a superabundant, discharge of pale, sometimes cherry-red or brown, and often muddy urine, low in density,

* The following summary is chiefly an abstract of what has been already made public by the writer. *See* ON GRANULAR DEGENERATION OF THE KIDNEYS, &c. 1839.

and coagulating more or less by the action of heat and nitric acid. When matters have remained for some time in this state, —which may be for months, or perhaps even for a year or two,—the disease is at length developed either by the supervention of the acuter symptoms somewhat modified, or more generally by the accession of one of the secondary disorders. The fundamental disease is then commonly thus indicated. The strength is much reduced, the body more or less emaciated, the complexion either of a uniform waxy paleness, or dingy, and the skin dry, and little disposed to perspire. There is often drowsiness, often too sickness or retching in the morning, and enfeebled digestion, with much thirst. The urine presents the characters already mentioned, and the blood is thin, watery, and unusually defective in colouring matter. Secondary affections are exceedingly common; the most frequent of them being dropsy, acute and chronic visceral inflammations, diarrhœa, rheumatism, both acute and chronic, catarrh, diseased heart, and coma. Life may be prolonged for many years under this chronic form of the disease, provided the secondary affections be avoided or easily subdued. But sooner or later the fatal event is occasioned by slowly developed coma, unless some other secondary disorder intervene, and terminate fatally in its own way.

The only essential characters of the chronic form of granular disease of the kidney, are a reduction in the density of the urine, with diminution of its solids, excessive reduction of the colouring matter of the blood, and leucophlegmatia. The presence of albumen in the urine, contrary to the opinion of some authors, is not invariable, though a very general fact.

Such is a sketch of the symptoms which belong more or less essentially to the two forms of this disease. As the condition of the urine and that of the blood are highly important in relation both to its diagnosis and to its pathology, some details on these two heads are called for.

The urine presents a considerable variety of characters, depending more especially on the stage or form of the disease. In the early stage and acute form its essential characters are a moderate reduction of density, a material diminution of the daily discharge of solids, and a strong impregnation of albumen. In the advanced stage and chronic form its sole essential character is reduction of density; but very generally too there is albumen present, though in small quantity, and for the most part the daily discharge of solid matter is much reduced. There are also, however, other qualities of the urine which well deserve attention, although far from being invariable.

When the symptoms put on the acute form in the early stage, the quantity of urine is most generally a good deal diminished, often to a few ounces daily, sometimes to a few drops only. Its colour is commonly natural, sometimes blood-red. It is often turbid and continues so even after many hours of rest, in consequence of abounding in minute particles which are insoluble by heat, and are occasionally oleaginous in their nature, but far more generally consist of modified mucus, or the scales of the epithelion of the urinary mucous membrane. It sometimes deposits lithic acid on cooling, and more rarely lithate or phosphatic sediment on standing a few hours; occasionally it decays very soon, and becomes powerfully ammoniacal; but the reverse is the general rule. The density is for the most part under the healthy standard of urine not abounding in quantity; but the difference is not material, the common range being from 1018 to 1021. Albumen is usually present in large quantity, as shown by heat or nitric acid, severally or conjunctly, occasioning a bulky coagulum. It is sometimes so abundant that the urine forms a uniform tremulous jelly when heated, or else a uniform thick pulp without the separation of fluid. It is seldom so small in amount as to occupy less than a third of the volume of the fluid after the coagulated urine has been allowed to rest for twenty-four hours; and if the coagulum be separated, washed, and dried, it will be found to weigh seldom less than ten, sometimes so much as twenty-seven grains in every thousand of urine. The best method of searching for albumen in the urine is to treat it, first with heat alone, and then with nitric

acid. Heat singly is in general a sufficient test where the proportion of albumen is so large as it invariably is in the acute form; but where the proportion is moderate, the acid is necessary,—on the one hand to secure the separation of the albumen, which may be kept dissolved even under heat, if ammonia has been evolved by decay,—and, on the other hand, to distinguish albumen from the earthy phosphates, which, if in excess, may be detached in the form of a flaky precipitate by heat, but are re-dissolved by a drop or two of nitric acid. The examination should be made repeatedly, because occasionally the albumen suddenly disappears for a time. It is necessary to attend to the proportion of the albumen, both with a view to the prognosis and the treatment. For this end it should be coagulated in a tube, and left at rest for twenty-four hours; upon which the following degrees of coagulability may be noted:—gelatinous by heat; very strongly coagulable, where a distinct precipitate separates, occupying, however, the whole fluid; strongly coagulable, where it occupies half the volume of the fluid; moderately coagulable, where it occupies a fourth of the fluid; slightly coagulable, where it occupies an eighth; feebly coagulable, where it occupies less than an eighth; and hazy by heat, where a turbidity is occasioned without visible flakes.* Besides being diminished in quantity and density, as well as impregnated with albumen, the urine is always defective in the proportion of solids discharged in a given time. The amount of solids discharged in twenty-four hours seldom exceeds half an ounce, which is scarcely a fourth of the healthy average in a stout adult; and it is often only half that quantity or even less. It was observed above, that the urine is occasionally blood-red. In a few rare cases a large proportion of pure blood is discharged with it, and the urine has even been almost entirely displaced by blood.

When the symptoms put on the chronic form the quantity of urine is often natural, not unfrequently much above the healthy standard, so as to constitute a true *diabetes insipidus*, but sometimes on the contrary very defective. The last condition occurs chiefly when incidental inflammatory action is excited, or when the case is drawing towards a fatal termination; and in such circumstances the diminution is often so great, that only one or two ounces may be passed daily for many days consecutively. The colour of the urine is occasionally natural or brighter yellow than usual, but far more generally it is pale, often excessively so, frequently too blood-red, sometimes smoke-brown, both of which tints disappear when the urine is coagulated by heat. For the most part there is a peculiar opaline turbidity, not removable by repose, and arising from modified mucus, or the microscopic scales of the epithelion of the urinary mucous membrane; in rare cases strings of viscid mucus are seen. Urinary depositions are not common, yet both lithic and phosphatic amorphous sediments may be occasionally observed. The density is invariably low, very seldom above 1014, usually between 1007 and 1011, not unfrequently 1006, and in a few cases so low as 1004, or perhaps even lower, notwithstanding that the quantity of urine may be also at the same time defective. Albumen is com-

* It seems unnecessary to overload the text with any investigation of the fallacies, either the tests for albumen, or of albumen as a test of the presence of granular disease; but a few observations may be here appended. As to the tests for albumen, heat alone is sufficient where the quantity is so great as it usually is in the acute form; and, in all circumstances, nitric acid renders the test of heat unimpeachable. But nitric acid alone is inadequate; because, where lithate of ammonia abounds, lithic acid is separated; and heat alone is insufficient if the precipitate be small, because this may arise from separation of the earthy phosphates. All other tests are inferior in certainty and convenience. As to the indications derived from the presence of albumen, it appears unquestionable that certain kinds of food may occasion its appearance in the urine of some people; that it may also be produced there by certain poisons that act on the kidneys; occasionally by true nephritis, always more or less by pyelitis; rarely by tubercles; often by carcinoma; often by scurvy and by purpura; seldom during the crisis of acute inflammatory diseases or continued fever. Simply and abstractedly, therefore, it is not a proof of granular disease being present in the kidney; but it is far more frequently produced by granular disease than by all other causes put together; and no other cause yet known ever occasions so large a proportion in the urine as is generally seen in the early stage, and sometimes, too, in the chronic form of the disorder; so that urine, at least *moderately coagulable*, according to the definition given above, probably always indicates granular derangement.

monly present, and in such quantity as to occupy, when coagulated and allowed to rest, between a fourth and an eighth of the volume of the liquid. It is sometimes, however, absent altogether for a time, especially where the urine is discharged more freely than natural, or towards the close of very slow cases where the density is excessively reduced, though the quantity be likewise greatly diminished. Its proportion generally increases when incidental inflammatory action is excited; and in that case the urine puts on the characters of the acute form of the disease, except that its density continues very low. It is a complete mistake to hold with some late authors that the albumen increases in proportion as the disease advances. The converse proposition is more generally true; but deviations from that rule may occur, partly caused by incidental attacks of inflammation, partly depending in all probability on peculiar modifications of the fundamental disorder. The daily solids of the urine are reduced in quantity. This reduction may be inconsiderable where a spontaneous or artificial diuresis makes compensation by diminished density; but if diuresis do not exist, the solids may be reduced from 67 to 24, or even 15 parts in 1000, and from two ounces to a third of an ounce or even only one drachm in twenty-four hours. The diminution of solids seems to affect all the principles of the urine indiscriminately; but more accurate inquiries on this head are still wanted.

The state of the blood is scarcely less remarkable than that of the urine; and like the latter, the former differs in the acute and chronic forms of granular disease. In the acute form and early stage of the disorder the blood commonly presents a very strong buffy coat, and frequently a lactescent serum, which yields fatty matter to sulphuric ether. Its serum is much reduced in density, namely from 1029, the healthy average, to 1024, 1022, 1020, or even 1018. As this reduction is chiefly owing to the loss of albumen, the serum coagulates loosely when heated, and instead of ten contains often only six per cent of solid matter. The reduction in density is always proportional to the amount of albumen discharged with the urine, and the length of time this discharge has existed. The serum very generally contains urea, and always when the urine has been for some time much reduced in quantity. It is discovered most certainly by evaporating the serum to dryness over the vapour-bath, boiling the pulverised residuum in absolute alcohol, dissolving the alcoholic extract in water, filtering the solution, and adding to it in a watch-glass half its volume of nitric acid; upon which scaly crystals of nitrate of urea are gradually formed. The fibrin is commonly increased in proportion as in inflammatory blood. The hæmatosin, or colouring matter, is unaltered, provided the disease be really in the incipient stage; but as the disease advances, it is rapidly and greatly diminished. In the chronic form and more advanced stage, the properties of the blood undergo further alteration. The crassamentum does not present a well-marked buffy coat, nor the serum much lactescence, unless inflammation or general reaction concur. The clot is small, or if large loose; and the serum is unusually abundant. The density and solids of the serum are for the most part little or not at all reduced, sometimes even above the average of health. This depends upon the state of the urine as to albumen. If local inflammation, general re-action, or any other cause, should occasion an abundant discharge of albumen with the urine, the serum is reduced in density and solid contents, exactly as in the acute form of the disease. But in most cases of the chronic or passive form, where little albumen is found in the urine, the serum possesses its natural density, or is even seen so high as 1031, and containing 97 instead of 80 parts of solid matter in one thousand. The serum frequently contains urea, but only when the daily discharge of solids with the urine is much reduced. Hence in the middle stage of the disease it is commonly absent, unless where incidental causes occasion a diminution of the urine; but in the most advanced stage it is commonly present; and towards the close of protracted cases it is seldom altogether wanting. The salts of the serum are in their usual proportion. The fibrin too is commonly natural in its proportion. Very different is the case in respect to the hæmatosin of the blood. When the disease has made

some progress, whether in the acute or chronic form, the hæmatosin is invariably reduced, and the reduction increases quickly as the degeneration of the kidney advances. Probably no other disease except hæmorrhage occasions so great an impoverishment of the colouring matter of the blood. The healthy proportion in a stout male being, about 1340 grains in 10,000, it has been found reduced in granular disease of the kidney, according to its stage, to 1110, 955, 720, 564, and even 427. The degree of leucophlegmatia corresponds of course with this reduction. The inferences to be founded on these interesting facts are liable to uncertainty, where the patient has been frequently and largely bled, or where he has suffered severely from some of the exhausting incidental diseases, or where the appetite is small and digestion indifferent. But the tendency of granular disease of the kidney, to induce extreme reduction of the hæmatosin of the blood, is undoubted, having been observed where the appetite and digestion had been always tolerable, the blood never impoverished by venesection, and the patient little troubled with secondary disorders.

Of the symptoms now laid down as proper to the fundamental disease, those most pathognomonic are the several morbid conditions of the urine. It would be wrong, however, to trust to these characters alone, as some have proposed. For determining the stage of the disease, the state of the urine is a valuable criterion; but the most unequivocal and most precise is the proportion of hæmatosin in the blood, checked of course by reference to incidental circumstances, and especially frequent, free, and recent bloodletting.

Secondary diseases. Granular disease of the kidneys may follow its course from first to last, without any other symptoms than those hitherto described as proper to the fundamental disorder. Such cases however are rare. In the state of the constitution induced by it, there is an excessive liability to various secondary or incidental maladies. One of these indeed is so common, namely anasarca, that several esteemed pathologists have held it to be universal and primary, not secondary and occasional. But, from repeated observation, the writer is fully persuaded that this doctrine is founded on error.

The secondary diseases are of great practical consequence; for they are often the first signal of alarm by which the primary disease is indicated. They are rendered much more obstinate than usual by the concurrence of the renal disorder; they constitute the chief sources of immediate danger in its course, at least for a long time; and if they are warded off, life may be protracted for a number of years in a state of very material comfort. The most important secondary affections are dropsy, diarrhœa, pleurisy, peritonitis, pericarditis, pneumonia, catarrh, dyspepsia, chronic vomiting, coma, chronic rheumatism, and chronic organic diseases of the heart and the liver.

Dropsy is the most frequent of all the secondary diseases; it was the one which first drew the attention of *Dr. Bright* to the disorder of the kidneys; and it is still the affection which most generally excites for the first time a suspicion of the existence of disease in these organs. Yet it is not essential. Instances occur where the disease of the kidney runs a long course without any dropsical effusion. It is, however, the most frequent of all the causes of dropsy. The form it most generally occasions is general dropsy or anasarca, attended with more or less effusion into the great serous sacs, and into the pulmonary cellular tissue. The anasarca affects chiefly the limbs and the face, sometimes the latter only. Effusion into the serous sacs is seldom considerable, unless either the general anasarca is very great, or there is an organic disease of some other organ in the cavity besides the kidneys. Most cases of what are usually called inflammatory dropsies depend on disease in the kidney. Many dropsies consequent upon scarlatina are of the same nature. So also are probably all those where the œdematous parts are elastic, and do not pit upon pressure. So too are most, if not all, cases attended with diuresis, provided the urine be not saccharine; and such cases, strange as the fact may appear, are far from being uncommon. Lastly, it is probable that all dropsies owe their origin to the same cause, which are associated with urine of very low density, and not above

the natural standard of quantity, whether it be albuminous or not. In dropsy from granular disease of the kidneys the urine is not necessarily albuminous. For the most part, however, it is more or less so; in the early stage of the primary disease this impregnation is always abundant; and the same is the case at all stages when the dropsy appears with the inflammatory character. This secondary disease is probably owing to an increased tendency to transudation, in consequence of the blood being rendered unusually thin and watery in the early stage by diminution of its albumen, and in the advanced stage by reduction of its colouring matter. It is always a most important object in the treatment, because so long as it prevails every other disorder, and almost every other symptom indeed, is apt to be exasperated.

A variety of affections of the stomach may attend granular disease in the kidney. Among those the most familiar is simple dyspepsia or defective digestion, with its customary train of symptoms. The most serious is chronic vomiting, which consists sometimes only of constant sickness and vomiting, occurring as soon as the patient awakes in the morning, but at other times of frequent vomiting throughout the day, and the rejection of all articles whatever which are swallowed. This affection is particularly apt to be troublesome towards the close of the disease; and it is sometimes the immediate cause of death, in consequence of deficient nutrition, and exhaustion. It does not appear to be generally connected with re-action, inflammation, or any organic disturbance of the stomach. It is always an obstinate complaint, difficult even to palliate, and apt to be renewed.

Diarrhœa has been a very common secondary disorder, as the disease shows itself in Edinburgh. It appears sometimes obviously connected with errors in diet, but more frequently arises without an obvious cause. It sometimes depends merely on inordinate irritability and increased discharge from the mucous membrane of the bowels, and may thus continue long and until death without any particular morbid appearance being discoverable afterwards; but more generally it is nothing else than a chronic dysentery, depending on intestinal ulceration. There is often little pain. The evacuations consist for the most part of watery fæces. It appears sometimes a benignant affection, which carries off dropsy; but far more generally it is a troublesome exhausting complaint, difficult to subdue, and not unfrequently the immediate cause of death. It has not been observed anywhere so often as at Edinburgh; yet bowel complaints in other circumstances are certainly not more common there than usual.

Inflammation of the serous membranes has been observed as an incidental disorder in every quarter where granular disease of the kidney has been studied; but it appears to be more frequent in London than anywhere else. Pleurisy is the most common variety, next peritonitis, and next pericarditis, which is seldom met with. These disorders are apt to be induced by incidental exposure to cold, and to occur on occasions when the primary disease commences in the acute form, or puts on that form in its subsequent course. They are sometimes latent, commonly severe; but, unlike the other secondary disorders, are easily subdued.

Catarrh is one of the most important of the secondary affections. It is often associated with emphysema; and in one shape or another is seldom long absent in any case, at least in northern latitudes. It is occasionally acute, much more frequently chronic. It is often enough cured, yet it is frequently obstinate, and in many instances it is the immediate occasion of death. Few survive long if it be obstinate, more especially where extensive anasarca concurs, and the primary disease has made some progress.

Coma and apoplexy are among the most frequent of secondary diseases, and none else is so unfavourable. Sometimes an apoplectic attack supervenes suddenly, and proves quickly fatal; but this is far from being a frequent occurrence. In general the head affection comes on in the insidious form of increased drowsiness, and perhaps some bluntness of the senses and obtuseness of mind. Gradually the drowsiness passes into constant stupor, and this into

complete coma, which is occasionally interrupted by convulsions, but much more frequently not. A week at least commonly elapses between the first approach of drowsiness and the fatal event, where the primary disease is of long standing; but where the renal affection is in the incipient stage, and re-action present, the course of the head affection is much more rapid. It is at times connected with congestion or extravasation of blood within the head, or with serous effusion; but generally with no particular morbid appearance, except unusual paleness of the brain, and want of blood in the cerebral vessels. It is commonly connected with suppression or extreme diminution of urine, yet this connexion is not invariable. Extreme diminution, however, seldom prevails long without coma beginning to form. There is no necessary connexion between the extent of the dropsical effusion and the risk of coma. Arachnitis has been observed as a secondary affection of the head by *Dr. Osborne*, and repeated attacks of epilepsy by *Dr. Bright;* but these disorders are comparatively rare. Coma is always a most formidable affection, and is indeed very seldom amenable to treatment. Perhaps it ought not to be considered as merely a secondary affection; for it would rather appear to be the natural termination of the primary disease, where it is not abruptly put an end to by some other undoubted incidental disorder. It seems to be occasioned by poisoning of the blood with the undischarged principles of the urine. At all events urea is always found abundantly in the serum of the blood, unless where congestive or sanguineous apoplexy is the particular form of the affection. According to the experience of all observers of the renal disease as it occurs in Edinburgh, this is at the bottom of almost all the obscure cases which every now and then occur of coma in connexion with suppression of urine.

Chronic rheumatism has appeared so common an accompaniment of the advanced stage of granular disease of the kidney, that in all cases of obstinate rheumatic affections, the condition of the urine should be inquired into. It generally puts on the form of mere neuralgia; occasionally, however, the joints present swelling and redness. It is always troublesome to remove. Where dropsy concurs with the primary disease rheumatism is rare.

Pneumonia is not common, pulmonary inflammation putting on more generally the form of bronchitis. It nevertheless sometimes attends the acute form of granular disease of the kidney, both in the early and in the more advanced stages. Like other acute inflammations, occurring incidentally in the same circumstances, it is sometimes severe, but for the most part easily checked by proper treatment.

Lastly, organic diseases of the liver and heart concur very frequently with granular degeneration of the kidneys. Sometimes the one, sometimes the other disease is obviously prior in origin; at other times it is impossible to say which commenced first; and occasionally the three organs are affected together, and nearly in the same degree. The most common affection of the heart is hypertrophy, with or without valvular obstruction; and this is for the most part betrayed by characteristic symptoms. It always adds greatly to the patient's sufferings as well as danger, and is a frequent cause of death by aggravating anasarca or catarrh. Organic disease of the liver is often much more obscurely marked. Most of the local signs, usually trusted to, may be produced equally by the renal disease alone; its best local signs, fulness, hardness, and dulness on percussion in the right hypochondrium and epigastrium, may be rendered fallacious by serous effusion into the peritoneal sac; and the most common variety of diseased liver in cases of granular liver, namely the tubercular condition proper to intemperate habits, is far from being always attended with enlargement. Where other diagnostics are insufficient to decide the question of its presence, it may commonly be inferred to exist where ascites is a predominating part of the dropsical effusion.

Such are the principal diseases which may occur secondarily to granular degeneration of the kidney. It remains to be observed, that on the contrary

this disease of the kidney may occur secondarily to other disorders; among which those hitherto well ascertained are organic diseases of the liver, hypertrophy, and valvular disease of the heart, and phthisis pulmonalis. Further it may be added, that in diseases generally the accidental presence of granular kidney is almost always the source of additional danger, by aggravating the other disease; which has been well exemplified in the late epidemics of continued fever and malignant cholera of Edinburgh.

Causes. When granular disease of the kidneys appears in the chronic form its cause is generally very obscure. Even the acute form sometimes cannot be referred to a specific exciting cause; but generally some unequivocal exposure to cold, or to wet and cold together, precedes it; and many ascribe it to sitting down on a cold stone, or taking a hearty draught of cold water while over-heated, or getting wet during night-watching. In a few instances the disease has apparently followed a blow upon the loins. Constitutional circumstances clearly predispose to it. These are the constitution of intemperance, the scrofulous habit, and that state of the system which succeeds scarlatina. A very large proportion of the cases observed in Edinburgh have been clearly connected with long-continued habits of intemperance in the use of spirituous liquors. In not a few cases this agent has seemed adequate to produce the disease in its chronic form, without the co-operation of any other more direct exciting cause. In other instances it acts evidently by engendering a predisposition merely; and some other cause developes the renal affection. The strumous constitution is another predisposing circumstance by no means unfrequent; and a very common conjunction of circumstances is habitual intemperance in scrofulous constitutions. Doubts have been raised by some whether scarlatina predisposes to granular disease. But the writer would venture to suggest, that the negative evidence advanced by some can never outweigh the clear and positive evidence brought forward by others, and to observe, that the frequent dependence of granular disease of the kidney upon scarlet fever, at all events as a predisposing, and very probably as a direct exciting cause, is in his opinion firmly established.

It is not improbable that certain agents, which excite irritation of the kidneys, may be arranged among the list of causes. The urine becomes occasionally albuminous under the use of mercury, or in consequence of the action of cantharides upon the urinary organs, or after certain kinds of diet in which cheese, pastry, and heavy puddings predominate. It is not impossible that the frequent or continuous action of such agents may, in the end, induce granular disease of the kidneys in persons predisposed to it; and at all events, there is strong reason for thinking that cases of the kind have been observed after the constitutional action of mercury.

Age, sex, and profession have only an indirect influence. No age is exempt. Childhood presents a few cases; the period between puberty and adult age a greater proportion; manhood, especially towards the close of it, by far the greatest number; and extreme old age an occasional example. Cases have been met with at the age of five, and younger; and one instance has been recorded by the writer, where the patient was an old man of seventy-nine. Of 74 fatal cases *Dr. Bright* found 19 under thirty years of age, 50 under the fiftieth year, 13 above fifty, and 4 above sixty. After infancy the effect of age is referrible to the relative predominance of intemperate habits, and the liability to exposure to atmospheric inclemencies. Profession acts in the like manner. A large proportion of cases in the lower ranks occur among those trades which subject workmen to vicissitudes of heat and cold, or to contract intemperate habits. An erroneous idea has been prevalent that the middle ranks may claim exemption. On the contrary, further experience more and more convinces the writer that the disease is by no means confined to the lower ranks, though, without a doubt, proportionally more frequent there; that cases are often met with among persons of easy circumstances by those practitioners, at all events in Edinburgh, who have made themselves conversant with the

subject; and that, by others, the disease is not unfrequently lost sight of where it affords the only explanation of apparent anomalies.

Prognosis. An opinion has gained currency, that granular disease of the kidney is an incurable affection; but fortunately its validity admits of question. When the disease is in its early stage, as determined by the urine being not much under the natural standard of density, and by the blood containing nearly its due proportion of colouring matter, there seems no reason to doubt that thorough recovery may be accomplished. If most cases of inflammatory dropsy with coagulable urine after scarlatina are connected with the early stage of granular kidney, which seems probable, radical cures are not uncommon. In other circumstances the practitioner is much more frequently disappointed, because he is apt to mistake for the first commencement of the disease an acute attack, occurring incidentally in the middle of its chronic and latent form. Even in cases unconnected with scarlatina, however, it seems probable that complete recovery may be brought about when they are subjected to early and judicious treatment. It is certain at any rate, that in such instances all secondary affections have been removed, all local uneasiness subdued, sometimes even the urine restored to its natural state, and the patient ascertained to enjoy good health for two years and more afterwards.

More generally, though we may succeed in apparently restoring health, the urine continues essentially morbid and more or less albuminous; and in that situation it is not unlikely that the organic derangement may make insidious progress, while it is certain that trifling causes may renew the previous symptoms essential as well as incidental.

When the disease is somewhat advanced, it cannot be removed; because, besides consisting of a morbid deposition in the kidney, it occasions atrophy of the proper renal structure, the loss of which cannot be repaired. But although the disease, or rather its effects, cannot be removed in this stage, it is probable that they may be arrested so as to proceed no further, and to admit of life being long preserved in a state of comfort and tolerable health. Such at least seems the rational explanation of the cases, now ascertained to be not uncommon, where the urine continues permanently pale, low in density, and feebly albuminous, although all symptoms of suffering have been removed, all secondary affections arrested, and the general health maintained substantially good for three, four, five years and upwards.

The probability of recovery depends, in the first place then, on the stage of the disease; but it also depends greatly on the nature, number, and severity of the secondary diseases. Most of the secondary disorders are obstinate when they concur with diseased kidneys. Dyspepsia may be much mitigated, but is apt to recur. Chronic vomiting, once fairly established, is seldom effectually checked, and may be considered an unfavourable sign. Diarrhœa is difficult to stop, and apt to return, and therefore must also be viewed as unfavourable. Catarrh is often removable; but where it resists treatment, the complication is of evil import. Coma is very rarely arrested, and is one of the most unpropitious prognostics among secondary affections. Diseased liver and diseased heart are also unpropitious, being themselves incurable, besides aggravating the effects of the renal disorder. The acute inflammations are generally severe, but commonly yield to remedies. If they recur often, however, they will generally prove at last the cause of death. Dropsy, unless excessive, is by no means always an unfavourable sign. The effusion is sometimes difficult to remove; but for the most part it yields at last; and its removal is usually attended with marked improvement in all the other symptoms.

The danger is not proportional to the amount of albumen in the urine. On the contrary, where it abounds, the disease is commonly in its incipient stage; and where it is scanty, the disease may be far advanced. Its gradual disappearance is favourable, especially if combined with a gradual increase of density in the urine. The danger is not proportional to the inflammatory state of the blood; yet this state requires watching and sometimes treatment. The

danger is greatest where the colouring matter is most reduced in proportion to the other ingredients of the blood. The danger is not always urgent when the dropsical accumulation is great. Incidental risks, indeed, arise of speedy death from dyspnœa, or from distension occasioning erythema and gangrene; and besides, so long as the dropsy is considerable, the other symptoms are all more troublesome. But the dropsy is commonly to be removed with perseverance. The greatest amount of dropsy usually occurs in the early stage of the primary disease. The danger is on the whole proportional to the lowness of the density of the urine, especially where the quantity is also defective. But a better way of expressing this rule is to say, that the danger corresponds with the diminution in the daily discharge of solids in the urine. A patient may live long and in comfortable health, where the diminution has reduced this discharge to one third of the natural average; when it descends to a fourth, troublesome secondary symptoms are apt to show themselves; and any materially greater reduction is soon followed by urgent symptoms, and most generally by drowsiness, leading on to coma. Suppression of urine is invariably a fatal prognostic. Gradual increase of the density of the urine, its quantity remaining the same, or increasing, is a very favourable circumstance. In the advanced stages, a spontaneous diuresis seems a favourable incident; and so long as it continues, the patient enjoys tolerable health. The reason is apparently that the quantity makes up for the lowness of density, so that a full amount of solids is discharged daily. The writer has known the health maintained tolerably entire for four years in such circumstances, the patient passing towards eighty ounces daily of pale urine, about 1010 in density.

Anatomical characters and pathology. A considerable variety of alterations of structure are found in the body after death from this disease. Several peculiar derangements of structure are seen in the kidneys; and other organs too are extensively affected, in correspondence with the symptoms during life.

It is probable that the term Granular Disease, so far as concerns the precise appearances found in the kidneys, has been applied too generically. Several forms of disease have been comprehended under it, to whose anatomical characters the name does not well apply, although the phenomena during life, as hitherto known, are much the same in all. At least seven distinct appearances have been described as occurring in connexion with albuminous urine and the various symptoms described above; namely, 1. congestion of the kidney with enlargement, and with or without deposition in its internal structure; 2. a granular deposition into its cortical and tubular textures, sometimes finely granular, sometimes roe-like, and attended with atrophy, or absorption of the proper renal tissue; 3. deposition of a homogeneous yellowish-grey matter, with similar atrophy; 4. disseminated tubercles; 5. induration of semicartilaginous hardness; 6. atrophy, from disappearance of the proper renal structure, with little or no deposition; and, 7. mere anæmia, or paleness, an appearance, however which is of very doubtful existence as connected simply with albuminous urine and the collateral symptoms. The relation which these several appearances bear to one another is not yet thoroughly understood. In all probability some of them are related together as different stages of one disease. *M. Rayer* is of opinion that the fourth, fifth, and sixth appearances bear no precise relation to true granular disorganisation, and that the last two of these are the result of simple chronic nephritis. It is probable, however, that this is a too limited and erroneous view of the subject. All the forms mentioned above agree in occasioning atrophy or absorption of the proper renal structure; and there can be little doubt that this result is the cause of many of the symptoms observed during life, and the immediate source of danger and death. It may be well therefore to arrange the succeeding observations on the morbid appearances, according to the degree of this particular effect.

In the early stage the organic changes in the kidney may escape notice unless carefully looked for. When the disease has put on during life the acute form, the kidneys are found flabby, friable, larger than natural, and commonly

twice, sometimes four times the natural weight of four ounces; externally dark with ecchymosed spots, internally also dark and full of blood, and speckled often with darker ecchymosed spots, especially in their cortical structure. The cortical texture, which is sometimes alone diseased, and always most affected, is broader than natural, sometimes twice or thrice its usual breadth, and often presents a deposition of granular matter, similar in 'colour to the surrounding healthy texture, and therefore seen with difficulty unless the kidney be injected with fine injection, in which case the matter does not flow into the morbid deposition, but every where surrounds and defines it. Unless this precaution be taken, the appearances resemble closely those observed in the early stage of simple nephritis, for which they have accordingly been sometimes mistaken.* Where the case has lasted some weeks the amount of the granular effusion may be so great as materially to obscure the proper coarsely-striated appearance of the cortical portion of the kidney.

The bladder is in such cases contracted, and contains only a few drops of pale urine, highly albuminous, and of rather low density. Other organs present various morbid appearances, which will be mentioned presently under another head. They are chiefly the traces of inflammation and hydropic effusion in the serous sacs. In the head, if death take place by coma, which is the usual course, there is occasionally found congestion of vessels, extravasation of blood, or serous effusion; but much more generally no unusual appearance is seen to explain the manner of death; the state of the brain is that of the simple apoplexy of *Dr. Abercrombie*. The blood commonly contains urea, and always if the urine was much diminished for some days before death, which is commonly the case.

We are not well acquainted with the appearances presented in the body in the early stage, when the disease assumes the chronic form at that period; obviously because, on the occasions when death takes place in such circumstances from an independent disorder, the attention of the practitioner is rarely called to the state of the kidneys either before or after death. But in all probability the appearances are simply a minor degree of the deposition observed in the more advanced stages.

In the middle stage, when the morbid deposit has made some progress, the following are the states observed:—The cortical texture is chiefly, or almost solely affected; but often the disease may be traced also in the internal tubular structure. The kidney is sometimes of the natural size, occasionally rather diminished, often considerably enlarged. If large, it is commonly softer than usual, and rather flabby; if diminished, it is occasionally somewhat hardened. The investing membrane may in general be easily stripped off. The external surface is pale, greyish-yellow, or greyish-brown, either uniformly so, or more commonly mottled, and also speckled with star-like and linear spots of vascularity; and it is also rough, often granular, rarely in this stage botryoidal or roe-like as at a later period. Internally the cortical texture has almost or entirely lost its striated appearance and natural reddish-brown hue. It is greyish, yellowish-grey, or reddish-yellow, finely granular, or homogeneous, and admits very little or none even of the finest injection. The same characters are seen in that part of the cortical matter which dips between the tubuli. The tubuli themselves are not much affected; but generally some specks of deposit may be seen among their striæ, expanding somewhat their bases, and rendering the fibres finer and more obscure than in the healthy state; and sometimes their papillæ present red indurations.

The bladder, the urine, and the blood are much in the same state as in the early stage. Other organs present a variety of morbid alterations, varying with the secondary affections during life. The supra-renal glands are often

* *M. Rayer*, in criticising observations made in Britain by the writer and others on the early stage of the disease, seems to have fallen into this error.

tuberculated and granular. In the head the brain is usually found pale, and with its membranes less vascular than in ordinary circumstances; but sometimes there is distinct congestion, and more rarely extravasation. Dropsical effusions are often seen in the cellular tissue, lungs, peritoneum, pleura, and more rarely in the pericardium. Emphysema is common, together with the traces of catarrh, namely redness and mucous gorging of the bronchial tubes. In the lungs, besides œdema, there may be seen redness, sanguinolent infiltration, and hepatisation, being the traces of pneumonia. Turbid serum, with soft curdy fibrin, is found on the peritoneum or pleura in some cases, indicating recent inflammation of those membranes. The mucous coat of the intestines often presents redness, effusion of lymph, enlarged muciparous glands, and ulceration. The liver is often tuberculated and enlarged, the spleen softened, the heart hypertrophied, dilated, and enlarged on one or both sides, and sometimes with its valves contracted in the usual way. Among the rarer appearances are œdema of the glottis, ulceration of the larynx, redness of the mucous membrane of the stomach or bladder, induration of the spleen. Traces of old inflammations are not uncommon. All these appearances are of course secondary merely to the fundamental disease in the kidney. They are more frequently seen in this than in the early stage of the primary affection. Although they correspond on the whole with the symptoms during life, they are also often found in the dead body, when they were not betrayed previously by any symptom.

In the advanced stage of the renal disorder the tubuli become involved to a greater extent. The external appearances of the kidney may be the same as before; but frequently too it is lobulated, botryoidal, roe-like, or finely granular. The kidneys are sometimes larger than natural; but more frequently now than in the early stage they are found contracted, often greatly so, sometimes to one eighth of their natural weight. They are generally firmer, especially when contracted, and sometimes they approach to cartilage in hardness. Internally, if the kidney is not diminished, the granular or homogeneous matter occupies a large proportion of the organ; the cortical structure presents scarcely a trace of its proper striated appearance; and the tubuli are some of them entirely gone, others broken up into detached fragments, others flattened, or, on the contrary with their bases expanded, and their fibres fine and delicate; and the matter of a fine injection passes only between the fibres of the tubuli, together with the great vessels passing through the degenerated cortical portion. If, as more generally happens, the kidney be contracted, its internal appearance is different, the cortical texture is narrow, the tubular bases drawn as it were almost to the surface, the morbid deposit trifling or almost wanting, and the tubuli contracted, twisted, and huddled irregularly together. In the most advanced cases the kidney may be seen large and composed of one uniform mass of granular or homogeneous deposit, with only one tubulus remaining of its whole original structure; or it is found shrivelled to the size of a crown, thin, flabby, almost membranous, and without a trace of healthy structure. In such cases the ureter is sometimes impervious. The renal veins occasionally present firm fibrinous clots. The supra-renal glands are indurated.

The bloodvessels and heart are unusually, sometimes excessively, destitute of blood; the membranous organs, blanched; the brain singularly white and free of vascularity; the blood commonly loaded with urea; and a great complication of secondary morbid appearances is usually seen, like those described above as occurring also in the middle stage. Instances do occur, however, of the primary disease in the most advanced stage, without any secondary morbid derangement of consequence.

It was observed at the outset of this enumeration of the morbid appearances, that the exact relation in which they all stand to one another is not yet thoroughly understood. But on the whole the probability is, that the disease consists substantially of a peculiar morbid deposit, preceded in the acute

form by congestion or even reaction in the kidney, but in the chronic form without any such precursor; that, as the deposit increases, the healthy texture of the kidney begins to be absorbed; that after a time, although the absorption of the healthy structure goes on, the deposition of the morbid deposit often ceases; and that possibly this deposit is sometimes absorbed in its turn. These views derive support, *first*, from observations showing in the two kidneys of the same individual the appearances of what are here considered two distinct stages of the same fundamental disease; and, *secondly*, from the consideration, that the different states of the kidneys in different cases correspond with symptoms during life, varying indeed in degree, but nevertheless essentially the same in kind. In the early stage the urine is found strongly albuminous and deficient in the daily discharge of solids, but not low in density. In the middle stage, whether the kidneys be found contracted or enlarged, and whether the morbid deposit in them be great or small, provided the natural structure be materially invaded, the urine is moderately albuminous, considerably reduced in density, and still defective in daily solids discharged. In the most advanced stage, where the healthy structure is extensively disorganised, either with much or with little morbid deposit, the urine is extremely pale, very low in density, feebly albuminous, unless incidental reaction arise, and exceedingly defective in the daily discharge of solid matter. Some apparent exceptions may be found to these general statements. But they are probably not real, and arise from cases having been included under the head of granular disease, which belong to other affections of the kidney, such as chronic inflammation, acute inflammation, atrophy, and tubercles.

This would be the proper place for considering what is the nature of the morbid action which gives rise to granular deposit and its accompaniment, albuminous urine. Nothing, however, can be brought forward on that subject at present, which is not purely theoretical, and unfit for full discussion in a work like the present. The chief question which naturally arises is, whether the morbid action in the kidneys is of the nature of inflammation or not. The question has derived importance of late, in consequence of *M. Rayer* having adopted the affirmative side, and, in accordance with that view, denominated the disease Albuminous Nephritis. Facts are still wanting to test the validity of that opinion. Meanwhile it may be briefly stated that the chronic form of granular disease, its most frequent variety, would appear as difficult to bring under the category of inflammation as any other chronic organic disease which could be mentioned; and that in most, if not in all, cases of the acute form, the symptoms of local and general reaction may be correctly viewed as secondary or incidental, and not as essential to the fundamental affection. Granular deposition in the kidney in short, like tubercular deposition in the lungs, may be either wholly unconnected with reaction, or it may follow general or local reaction; and the latter circumstance does not necessarily constitute it an inflammatory disease.

Treatment. The treatment must be directed first to the primary disease, and then to its complications or secondary affections.

In the acute form of the primary disease vigorous antiphlogistics are indispensable, and the treatment generally is very much the same with that of the acute inflammations. Free bloodletting, carried to faintness, or till the pulse is affected, and repeated after a short interval if the symptoms be not subdued, constitutes the main remedy. When the force of reaction has been somewhat mitigated, local bloodletting, in the shape of cupping and leeches to the loins, is more serviceable. Depletion is often equally required by the secondary complaints as by the primary disorder. In the latter its good effects are shown by the removal of local uneasiness, the diminution of the albuminous state of the urine, the increase of its quantity and density, and the improved feelings of comfort. The same active treatment is required where the acute form is superinduced by incidental causes upon the chronic form of the disease. But evacuations need not be pushed so far; and some reserve must be

shown in repeating them, on account of the impoverished condition of the blood. Hence it is advisable, whenever any doubt exists as to the real stage of the degeneration of the kidney, to examine the blood analytically, and ascertain the proportion of its colouring globules The general antiphlogistic regimen must of course be observed in this form, whether in the early or advanced stage. After a time counter-irritants to the loins, such as blisters, issues, and setons, are preferable to depletion.

These remedies become the most appropriate means so soon as the disease puts on the passive form, and, along with occasional leeches, may be used from the first in the cases which do not present an acute stage.

The maintenance of the cutaneous discharge is of the first importance, in order to produce derivation from the kidneys. This is to be accomplished by warm clothing as soon as the febrile heat has passed away, by Dover's powder, in the dose of five to eight grains thrice a day, and by the regular use of the vapour-bath, or warm bath, every other evening or oftener. The last remedy is particularly useful for removing restlessness, anxiety, and want of sleep. James's powder may be substituted for Dover's powder, and some prefer the acetate of ammonia. But Dover's powder is the most useful, both as a diaphoretic, and likewise as a calmative for allaying pain and irritability. For the latter purpose, hyoscyamus may be combined with the other diaphoretics.

The bowels must be regulated by laxatives. But in general brisk cathartics should be avoided, because in some people they are apt to bring on the diarrhœa, which was described above as often a troublesome secondary affection. Diuretics are unnecessary unless where dropsy prevails, or coma is threatened, in connexion with great decrease of the urine. By some they are considered as positively contra-indicated in all circumstances, on the ground that they add to irritation in the kidneys. But this is not necessarily a just cause of contra-indication; because in therapeutics there is no want of instances, where a stimulus of one kind is employed without injury, in respect of the existence of a stimulus or irritation of another kind in the same organ. Besides, diuretics do not increase the albuminous contents of the urine, the amount of which is probably a test of the degree of local irritation; and there are instances where a continual spontaneous diuresis seems to be associated with the enjoyment of health for a period of years in the chronic state of the renal disease. Mercury is contra-indicated in all circumstances, except to aid the action of cathartics and diuretics. In granular disease it generally affects the constitution with great facility; the constitutional action is apt to be severe; and not improbably the peculiar morbid affection of the kidneys is increased rather than diminished.

When the disease has been brought by the preceding treatment into a state of quiescence or arrestment, a rigorous prophylaxis must be observed. Warm clothing, careful avoidance of cold and damp, abstinence from spirituous liquors or the abuse of wine or malt liquors, the use of nutritive digestible food in moderation, the observance of regular and brisk exercise, comprise the leading particulars of the prophylactic plan; and the warm bath at stated intervals is an excellent addition. By these means there is some hope of arresting the further progress of organic derangement of the kidneys, even where considerable advance has been made; and they are absolutely indispensable for avoiding the immediate sources of danger to life—the incidental development of secondary diseases.

As the secondary disorders are the chief sources both of danger and of discomfort, their treatment is a most material part of the method of cure upon all occasions. They may on the whole be treated as in ordinary circumstances. It must be always remembered, however, that the greater part of them are apt to be peculiarly obstinate; and a further consideration is, that the primary disease should always be kept in view, even when in the chronic form, and there-

fore that, as *Dr. Osborne* has pointed out, diaphoretics ought to be used, whatever additional treatment may be necessary.

Anasarca in the acute form requires, like the primary disease, free blood-letting. Without this preliminary no other treatment is available, and it is sometimes sufficient of itself, if vigorously employed at the first. General excitement or local reaction having been removed, the anasarcous accumulations may be treated by purgatives, diuretics, and diaphoretics. Diaphoretics sometimes succeed alone, and where they answer they are preferable, as being derivatives, besides avoiding any possibility of risk from additional stimulation of the kidneys. Purgatives are not to be recommended unless other means fail, on account of the risk of troublesome or dangerous diarrhœa arising; yet they may often be used with safety where the primary disease is not far advanced, the constitution not much reduced, and the bowels free of irritability. The most useful purgatives are gamboge, finely pulverised with cream of tartar, elaterium, and croton-oil with the compound colocynth mass. Diuretics have been condemned, first by *Dr. Osborne*, and latterly also by *Dr. Bright*, for the reason formerly assigned. The relief obtained from all other symptoms by the removal of extensive dropsical effusions is so great, that the usual means of accomplishing that object must not be lightly discarded. Were it generally possible to remove dropsy by diaphoretics, as is stated by these authors, diuretics might be advantageously avoided. But the diaphoretic plan certainly has not succeeded so often as is desirable in the trials of it which have been made in the Edinburgh Infirmary. Besides, it was observed previously, that doubts may exist whether diuretics are apt to produce the injurious effects as stimulants of the kidneys, which have been imagined. On the whole, the writer would infer from his own frequent experience, that they may be used in dropsy without risk of aggravating the primary disease; and that hydropic effusions cannot in general be so efficiently removed in any other way. The best diuretics are digitalis and bitartrate of potash, and it is useful to employ both at once; the former in the dose of one or two grains of the powder, or ten or fifteen minims of the tincture, thrice a day, and the latter to the amount of a drachm or two drachms as frequently. The decoction of broom-tops also often answers well, and squill sometimes: the spiritus ætheris nitrici more seldom succeeds; nor is nitre, carbonate of potash, or hollands, often serviceable. Where diuretics fail to act, their action is sometimes brought on by an emetic or a single brisk purgative. The effect of diuretics on the dropsical effusion is often very gradual, though steady; and they act for the most part more quickly in the advanced than in the early stage. When other means fail, it may be necessary to puncture the limbs. This should be done with acupuncture needles, not by means of incisions with the lancet, because the former method is less apt to be followed by inflammation of the integuments and sloughing. This risk is also lessened by resorting to punctures before the distension becomes very great. Diaphoretics should be united with the diuretic plan, and steadily persevered with so soon as diuretics cease to be necessary.

Dyspepsia is to be treated with bitters and antacids, and is often removed by removing concomitant anasarca. For chronic vomiting, when dyspepsia puts on that form, there is not any very efficient remedy. Æther, brandy, and ammonia, sometimes palliate it. Antacids also have occasionally the same effect. Blisters over the stomach are not unfrequently serviceable. Opium and hydrocyanic acid are often effectual for a time; and the most efficient perhaps of all palliatives is creosote in the dose of one or two minims.

Diarrhœa at its first appearance may often be arrested, as in ordinary attacks of this disease, by alternate doses of opium and mild laxatives, followed by small opiates regularly for some days. Where it puts on a more obstinate form, the best remedy is a combination of opium and acetate of lead, in the dose of one grain of the former and three of the latter, given in the form of pill thrice a day; which doses may be doubled if necessary. An opium suppository of

three grains is also often the most effectual of all remedies. The diet at the same time should be as much of an animal nature as possible, the drink should be restricted, and malt liquors and acids avoided. To quench thirst, which is often urgent, the best of all drinks is soda water or potash water, with or without wine.

The treatment of acute serous inflammations, pneumonia, and catarrh, scarcely requires any particular directions. It does not differ from the ordinary treatment of these diseases in other circumstances, and is commonly successful, except in catarrh, which is often obstinate. The best remedy is the removal of the dropsy, with which the catarrh is commonly accompanied. Squill, with opium, constitutes a useful expectorant and calmative. *Dr. Osborne* is partial to copaiva where expectoration is difficult, and to acetate of lead where it is profuse.

Chronic rheumatism, an untractable malady in all circumstances, is peculiarly so when coincident with granular kidneys. No method of treatment is even generally successful; but among various familiar plans the most beneficial appears to be the internal use of tincture of colchicum and muriate of morphia, together with the warm bath. Diseased liver is seldom improved by any treatment; but iodine is probably more often of service than any thing else. Diseases of the heart are always much improved, so far as their symptoms are concerned, by removal of the dropsy; and anodyne antispasmodics always relieve the spasmodic dyspnœa which attends them.

Coma, the most formidable of all secondary disorders, may be averted occasionally in the early stage of granular kidney, if the practitioner takes alarm in time, by free bloodletting, brisk purgatives, and active diuretics. Drowsiness, in connexion with great decrease of urine, may thus be prevented from passing into stupor. But where coma in such circumstances is once fully formed, treatment of every kind for the most part fails. Where the same affection occurs in the advanced stage of the disease, it generally approaches slowly and insidiously, and is with great difficulty averted. Where signs of cerebral congestion are present, which, however, rarely happens, local depletion is sometimes of service; and brisk purgatives are also proper where the patient's strength will permit of their use. But the chief remedies are diuretics; and where these fail to act, the case may be considered as almost desperate. The most effectual diuretic treatment consists in the combination of digitalis and bitartrate of potash. *Dr. Osborne* puts faith in calomel for averting coma.

OTHER CHRONIC ORGANIC DISEASES OF THE KIDNEYS.

Hyperæmia.—Anæmia.—Atrophy.—Tubercles.—Carcinoma.—Melanosis.—Development of the erectile tissue.—Phlebitis.—Serous cysts.—Hydro-nephrosis.

The remaining organic diseases of the kidneys will require but a few observations. They are interesting chiefly in relation to pathological anatomy, because the practitioner can detect few of them by characteristic symptoms, and cannot arrest any of them by treatment. The sketch here given of them is derived chiefly from the late investigations of *M. Rayer*.

Hyperæmia, though admitted as a disease, is probably a mere accompaniment of other diseases. In the dead body it is characterised by unusual darkness of the kidneys, gorging of their structure with blood, and increased vascularity. It attends the early stage of acute nephritis, the early stage of granular degeneration in its acute form, and frequently also diabetes. It is also sometimes seen, together with hyperæmia of other viscera, in severe cases of typhus. The

symptoms of mere hyperæmia, detached from those of the diseases it accompanies, are unknown.

Anæmia, or excessive paleness and deficiency of blood in the kidneys, is of doubtful existence as a local disease. It occurs in conjunction with a bloodless condition of the body generally; as in death from hæmorrhage after frequent copious depletion, or in consequence of protracted acute or chronic visceral diseases. But it is probable that cases of apparent anæmia of the kidneys have been rather cases of granular degeneration.

Atrophy of one or both kidneys can scarcely be regarded as a special disease, but is rather the consequence of various diseases. Almost all chronic organic diseases of the kidneys may be said to end in atrophy. Sometimes the atrophy of their proper structure is unattended with diminution of their size, or they may even actually increase in size, because a morbid deposit is at the same time thrown out. In other instances, the wasting of the proper renal structure is attended with gradual shrinking of the kidneys, till at length occasionally little else remains but a membranous substance. The symptoms essential to atrophy are, diminution of the colour, density, and daily discharge of solids of the urine; but a variety of other symptoms are superadded, according to the nature of the fundamental disease by which the atrophy is occasioned. The most frequent cause of atrophy with diminution of size is granular deposition, and next to this may be placed chronic nephritis. The appearances usually seen have been described under the former head.

Tubercles may affect either the membranes of the kidneys or their substance. They vary in size from that of small grains to that of an olive; and they are commonly granular and grouped among the tubuli, but large and detached in the cortical texture. Tubercular kidneys are seldom contracted in size, and seldom much enlarged, unless the tubercles obstruct the papillæ or ureters, and cause distension. The proper renal structure is sometimes injected, more generally atrophied. Tubercles seldom invade the capsule of the kidney; but the mucous membrane of the calyces, pelvis, and ureter is not unfrequently affected, and sometimes the bladder too is involved in the disease; while the substance of the kidneys seems about as liable to it as the inner membrane. Sometimes the whole mass of one kidney, and great part of the other, are converted into a uniform tubercular substance. Tubercles of the kidneys sometimes undergo softening; and occasionally they ulcerate and establish a communication with the colon, or with the subperitoneal cellular tissue. They are most frequent in adults, rare in infancy or old age; and they are seldom found in the kidneys without being seen also in other parts of the genito-urinary apparatus, and likewise in the lungs. The symptoms are very obscure and dubious. Tubercles often concur with granular degeneration.

Carcinoma not unfrequently affects the kidneys when it also exists elsewhere; but it seldom affects the kidneys alone. Sometimes it commences in adjoining organs, and is communicated to the kidney through juxta-position. At other times, on the contrary, it obviously commences in the kidney, and successively affects the parts in its vicinity, more especially the vena cava, which becomes gradually filled with carcinomatous deposition, and at length completely obstructed. The cerebriform or cephalomatous form of carcinoma is the most frequent variety. As the disease advances softening takes place, and the morbid deposit at last acquires a pulpy consistence like pudding. Its progress is sometimes attended with purulent deposits. The kidneys are sometimes not enlarged; but more generally they exceed considerably the natural size. As the cephalomatous matter increases, the proper renal structure diminishes, and at length entirely disappears. Fungus hæmatodes is a rarer form of carcinoma of the kidney. The morbid formation then consists partly of cerebriform matter, partly of clots of blood; and not unfrequently schirrous masses are scattered throughout the general fungoid mass. As in the case of

cephaloma, so here the renal veins and vena cava are often obstructed; but the obstruction is commonly occasioned by clots of blood. The substance of the kidneys is more frequently affected than the membrane of the pelvis. The symptoms are obscure, unless where the variety present is fungous hæmatodes; in which case there is frequent hæmorrhage from the bladder, conjoined with the constitutional characters of malignant disease. In one case under the writer's care where both kidneys were extensively affected with cephaloma, the urine was pale, low in density, and albuminous; the patient was subject to dropsy, and the immediate cause of death was coma; so that in all its circumstances, this case resembled during life granular degeneration. In another instance, where the cerebriform deposit had invaded the vena cava from the kidney, and caused total obliteration, the superficial veins on the abdomen, from the groins up to the mammary region, were greatly enlarged, to carry on the circulation of the limbs.

Melanosis has been met with in the kidney, seldom to a great extent, and never except when it also existed elsewhere. The *erectile tissue* has also occasionally been developed in small portions of the kidney. The renal veins have been found affected with *phlebitis* in persons who had died of uterine phlebitis, but very rarely without inflammation of the veins elsewhere. None of these disorders is indicated by characteristic symptoms. *Serous cysts* are often found in the kidneys, small in size, and few in number, without any symptoms having been observed during life. When more numerous, they are formed at the expense of the proper renal texture, and may lead to the usual consequences of diminished secretion of urinary solids. They frequently coincide with granular degeneration.

The last renal disease requiring notice is partial or general distension of the kidneys by urine, which has been conveniently termed by *M. Rayer*, *Hydronephrosis*. When the tube of one of the papillæ of a calyx is obstructed by a calculous or other cause, it becomes gradually dilated till a cyst of considerable size is formed in the kidney, which is filled with urine. In like manner when the ureter is obstructed by spontaneous contraction, the dropping of a calculous or hydatid into its cavity, the pressure of a tumour or calculus in the bladder on its orifice, or the pressure of a tumour of the uterus or vagina from without, the upper portion of the ureter, the pelvis of the kidney, and eventually the substance of the kidney itself, become distended by the secreted fluid. The same changes may occur from habitual retention of urine in the bladder, where the obstruction to the urine is in the urethra. In all these circumstances inflammation of the pelvis, or of the substance of the kidney, may ensue; as was stated under the head of the causes and complications of nephritis. But if the distension be gradual, no great irritation is excited, and either the pelvis and calyces only are dilated, or more generally the renal substance also, the cortical and tubular parts of which are gradually evolved, atrophied, and absorbed, till at last nothing is left but a membranous bag. These changes in the structure of the kidney take place in some rare cases without enlargement; more generally there is considerable dilatation, and at times the enlargement is enormous, so that the cavity contains eight pounds. Where the bladder has been long affected with retention, and its state neglected, there may be found, as in a case lately examined by the writer, great dilatation of the kidney, enlargement of the ureter to the size of the small intestine, and also enormous expansion of the bladder. The fluid contained in the sac is urine, commonly somewhat altered, and impregnated with albumen. This disease is seldom marked by characteristic symptoms. If it depend on obstruction to the flow of urine from the bladder, the renal disorder is obscured by the symptoms proper to distension of the bladder. Where the obstruction lies in the ureter, the disease may be altogether latent; but sometimes constant lumbar pain in one side may lead to a suspicion of mischief; upon which, if the dilatation be considerable, a tumour may be detected by manual examination. on placing the patient with his face on the pillow, and with his knees bent up under him. Most frequently

the disease continues undiscovered till after death. At times, simultaneous or successive obstruction of both ureters leads to total retention of urine, which imitates suppression.

DISEASES OF THE BLADDER AND URETHRA.

Inflammation. — Vesical catarrh. — Irritable bladder. — Diseases of the prostate gland. — Stricture of the urethra.

DISEASES of the bladder and urethra are generally held to belong to the province rather of the surgeon than of the physician. On that account, it is unnecessary to consider them in detail in a work on the Practice of Physic. At the same time, some of them may fall quite as well under the cognisance of the physician as under that of the surgeon; and it is indispensable that the former be acquainted with them, because the symptoms are often such as may otherwise lead him to mistake them for those diseases of the kidney, which fall properly under his care, and which have been fully treated of in the preceding pages. Hence it would be wrong to dismiss the subject of urinary diseases as a branch of the practice of physic, without some notice being taken of those which affect the bladder and urethra. But a short sketch of their diagnosis will be sufficient. These are chiefly inflammation of the bladder, catarrh of the bladder, spasm of the bladder, irritable bladder, diseased prostate gland, and stricture of the urethra.

Inflammation of the bladder may be occasioned by blows or other injuries in the neighbourhood of that organ, by acrid diuretics, by surgical operations involving the bladder, by the injudicious use of instruments for examining or treating diseases of the urethra or bladder, and by repelled gout and other more obscure causes. Its symptoms are acute burning or throbbing pain in the lower part of the pelvis, tension and tenderness in the hypogastrium, constant desire and inability to pass urine, with the usual constitutional signs of general reaction. The urine is at first scanty, dense, high coloured, and turbid on standing; but in a short time it becomes somewhat turbid even when just passed, probably from modified mucus, and not unfrequently blood is mixed with it. When the disease goes on unchecked, the pain extends upwards throughout the abdomen generally, which becomes tense and tender; nausea and vomiting, with great prostration, anxiety, and restlessness ensue; and involuntary discharge of urine, subsultus of the tendons, delirium, and commonly also convulsions, usher in the fatal termination. Certain varieties in the symptoms have been supposed to depend on the particular seat of the inflammation at the commencement; namely, retention of urine and excessive pain on introducing the catheter into the bladder, upon inflammation of the cervix; suppression and hypogastric tenderness, on inflammation around the vesical orifices of the ureters; tenesmus, on inflammation of the posterior surface.

Dr. Prout has described a form of cystitis, where the inflammation assumes the latent character in gouty individuals, consequent upon an attack of irregular gout. It is preceded by rigors; febrile exacerbations follow; and they gradually increase in severity. At length, irritative fever of the most formidable kind is established, attended with extreme prostration, oppressive nausea and vomiting, but for a considerable time without any urinary complaints. In the end retention of urine occurs more or less, and the external organs become tumid; after which the patient rapidly sinks. The urine does not deviate from the healthy condition.

It is plain that in the commencement of inflammation of the bladder, at which time alone any difficulty can occur in distinguishing it from inflammation

and other acute diseases of the kidneys, the diagnosis may be founded on the relative condition of the urine.

Catarrh of the bladder. The cystirrhœa of nosographists is usually distinguished from inflammation, though probably in its nature inflammatory, at least at the commencement. It is sometimes an acute, far more generally a chronic disorder, which attacks elderly persons chiefly, occurs in connexion with the gouty habit or strumous constitution, and seems to arise from exposure to cold, excesses of various kinds, acrid ingesta, stone in the bladder, or other urinary diseases. It sometimes commences suddenly, but for the most part gradually. The principal symptoms are shooting pains, with spasm and burning, in the region of the bladder, and a feeling of weight in the perineum; afterwards also frequent micturition and dysuria, and at length irritative fever, with much debility, weakness in the loins, emaciation, restlessness, and gradual exhaustion. The urine at first is acid, muddy with floating flakes, which only in part subside under repose, leaving an opaline appearance, which probably depends on suspended microscopic scales of the mucous epithelion. Afterwards it presents more distinctly an admixture of stringy mucus, which sinks to the bottom, and collects in a gelatinous mass, incapable of being again diffused by agitation; and in the severer forms of the disease mucus is often passed in gelatinous threads, which occasion great difficulty and distress in discharging urine. At the same time, the urine commonly becomes alkaline, often also somewhat albuminous, occasionally bloody; and not unfrequently it acquires a fetid putrescent odour. Alkalinity of the urine has been thought by *M. Rayer* not to show itself, unless nephritis concurs; but this is a doubtful statement. In the most advanced stages of very chronic cases, where ulceration of the inner membrane of the bladder may concur, pus is discharged with the urine as well as mucus, and at times there is considerable hæmorrhage. In all circumstances mucus, the characteristic ingredient of the urine in vesical catarrh, may be easily known from pus and other deposits by the jelly-like appearance which it assumes in the bottom of the vessel when the urine is allowed to stand for some time, and the supernatant fluid is poured off.

Other urinary diseases may in general be distinguished readily from vesical catarrh by the general symptoms and condition of the urine in their early stage. As they advance, however, the diagnosis becomes often very difficult; because in the course of time they are apt to be complicated with irritation of the bladder, and excessive secretion from its mucous membrane, so that it is not easy to determine which is the primary disorder.

Spasm of the bladder, a rare affection, which may occur at any age, but is chiefly observed in old people, is characterised by an acute sense of pain and constriction in the region of the bladder, sometimes stretching forward to the urethra; globular contraction of the bladder; retention of urine; frequent pressing calls to stool, often attended with protrusion of the rectum; excessive anxiety, restlessness, and clammy perspiration, but without any fever or tenderness on pressure in the hypogastrium. If not put an end to by proper measures, it may terminate fatally with the usual symptoms of suppression of urine.

The term *Irritable bladder* has been used in surgery with various meanings, being sometimes applied generally to the mere symptom of irritability of the bladder causing frequent micturition preceded by pain or other uneasiness, and sometimes restricted to that species of irritability which is connected with nervous causes or functional circumstances, and is independent alike of organic disease in the urinary organs and of any diseased condition of the urine. Irritable bladder, in its more comprehensive sense, may be occasioned by almost any organic disease of the kidneys, the bladder itself, or their adjuncts; and it is likewise often produced by functional disturbances, leading to a change in the qualities of the urine. The more specific disease, now conveniently indicated by the same term, is not uncommon among individuals of a nervous temperament, especially exhibiting itself in the female sex by a tendency to hysteria. It is often mistaken for more serious diseases of the urinary organs, but

may be known by the frequent and urgent calls to pass urine occurring only in the day-time, or being at least much more troublesome then, than during the night, by this symptom being aggravated by all causes of nervous excitement and diminished by tranquillity and repose, by the urine being perfectly natural both in quantity and quality, and by the absence of the other signs of organic urinary diseases. Among the organic diseases with which it is apt to be confounded, none perhaps is a more frequent source of error than granular degeneration of the kidneys; but the state of the urine supplies a ready mode of distinguishing them.

Diseases of the prostate gland have sometimes been confounded with other diseases of the urinary organs; but are easily recognised with ordinary care. Chronic enlargement of the gland, a very common disorder in old age, generally commences obscurely, and attains some size before attracting attention. Its symptoms are a sense of weight at the outlet of the pelvis, difficulty and effort in passing urine, sometimes complete obstruction, and enlargement of the part as felt through the rectum. When the gland is examined by the rectum, a catheter should be first introduced into the urethra, otherwise the healthy condition of the part may be mistaken by the unpractised for enlargement. Flattening of the fæces, a symptom mentioned by some authors, is not at all to be trusted to, and is indeed seldom observed, even in unequivocal cases of enlarged prostate. The urine at first is natural in its qualities; but as the disease advances, it is apt to become alkaline, and to deposit phosphatic gravel. Occasionally inflammation of the gland is superadded, the symptoms of which are, unusual sense of weight and heat at the neck of the bladder; sometimes pulsating pain, increased on pressure; tenderness of the gland, when examined by the rectum; pain on going to stool, with a sense of imperfect evacuation of the gut afterwards; frequent and urgent desire to pass urine, with difficulty in passing it, or complete retention. Inflammation is seldom confined long to the prostate gland; the bladder sooner or later becomes involved. Sometimes the inflammation leads to ulceration, which may be known by the progress of the disease, and the presence of purulent matter in the urine.

It may appear unnecessary to mention *Stricture of the urethra* among the disorders which may be confounded with diseases of the kidney. But as there are cases of purely renal affections, the prominent symptoms of which are referrible to the urethra alone, it often becomes necessary to inquire into the possibility of the existence of stricture. The diagnosis is to be founded partly on the mode in which the urine is discharged; but chiefly on an examination of the passage with a sound, catheter, or bougie.

DISEASES OF THE UTERUS AND OVARIA.

DISORDERED MENSTRUATION.

General observations on the phenomena of menstruation.—Imperfect puberty —precocious—tardy.—Faulty development.—Suspended menstruation, or Amenorrhœa—coexistent with healthy state of the constitution—with organic disease—with constitutional debility—with plethora.—Complications.—Treatment.—Vicarious menstruation.—Painful menstruation, or dysmenorrhœa.—Symptoms.—Inflammatory and neuralgic forms.—Causes.—Prognosis.—Treatment.—Excessive menstruation, or menorrhagia.—Pathology.—Causes.—Symptoms.—Prognosis.—Forms.—Treatment.—Chronic menorrhagia and its treatment.

For a period of about thirty-five years, the uterus pours out during a few days of each month a blood-like fluid, which does not seem to be so much a mere passive exudation, dependent on local causes, as the result of a general state of the female constitution; since this peculiar secretion shows itself as the external sign of a function, the development of which, we are certain, influences the whole organism.

Up to the ordinary age of puberty, the uterus had merely exhibited the lowest phenomena of animal life, those of simple vegetation or growth. At this period, however, it begins to put on the signs of a higher vitality in the acquirement of the additional properties of secretion and irritability. While these are localising, great changes are observable in the whole frame. The nervous system is altered in its capacity of emotion and passion, and the imagination is in an especial manner developed. According to Soemmerring, the cerebellum becomes much enlarged; the blood is attracted to the upper and the lower portions of the trunk, subserving to the rapid development of the mammæ and the pelvic viscera; the hips enlarge; the ovaria become red and swollen; the Fallopian tubes, with their fimbriæ, are elongated, erectile, and irritable; the uterus has acquired bulk, and a more sanguine hue; the organs of the thorax participate in the effects of that action, which is increasing the mammæ, so that the lungs, the larynx, and even the arms acquire the forms and contours of a maturer development; the intensity of vitality is such, and so complete is the resistance of the frame, at puberty, in the conflict against external elements, that the mortality of our species is least in this portion of our life.

On the other hand, the whole body suffers when the internal organs of generation are undeveloped: the mind is dull, and the emotions and passions depressed or absent; the vegetative function is less vigorous, and fat and cellular membrane is secreted instead of muscular tissue; the mammæ are withered, the lungs are scantily developed, and not only is life less intense but less long, and early phthisis soon puts a period to the workings of so faulty an organism.

We may therefore conclude that the menstrual flux, being a sign of puberty, should not be regarded as a mere passive exudation, but the index of a general state affecting the frame largely. This view is the more important, as it alone explains the phenomena of the disorders of menstruation, and points to that rational treatment, which is based not solely or mainly in the use of local stimuli for the mechanical attraction of blood to the uterus, but on remedies which, operating on the constitution, rouse and regulate those actions which constitute a function.

The developing and the sustaining this function depend it would appear on two circumstances:—1. they require a series of constitutional actions in all their plenitude of vigour; 2. there must be a healthy organ to which all these

actions tend. If either the one or the other be in fault, we shall have disorders of menstruation, springing either from constitutional or from local sources. Most frequenly both are conjoined, or very quickly become so.

Imperfect Puberty.

1. *Precocious Puberty.* The works of Haller, Meckel, and Meissner, contain examples of this state sufficiently numerous to establish the following general conclusions:—1. the signs of puberty may become visible at any period commencing shortly after birth, and extending up to the ordinary time of the regular development of that function: 2. the majority of cases exhibit these signs in the third year: 3. the frame in general participates but partially in the impulse given to the sexual development: the growth of the rest of the body never being on a par with that of the sexual organs: 4. the internal organs retain the type and texture of an early age, and soon exhibit the signs of premature decay: the ovaria are frequently diseased; the external organs are rarely harmoniously developed; the limbs are very short as compared with the trunk: 5. the mental faculties are in most instances obtuse, nay even deficient: 6. the individuals are short-lived.

In Haller's cases, amounting to upwards of thirty, and in those of Meckel and Meissner, there can be no doubt that the vaginal discharge was catamenial, as it was accompanied by all the marks of puberty. In other instances, however, there is reason to believe that simple exudation of blood per vaginam has been quoted as menstruation. Climate, heat, sedentary habits and a luxurious life, much and early excitement of the brain and emotions, irritation of the sexual organs, develop imperfect puberty.

Where the precocity is dependent on a misdirection of the vital force, it admits of as little medication as any other monstrosity of function and form. If there be that consent between the rest of the body and the function that there is the vigour and development to meet the waste by the reproductive organs, early menstruation is not precocity.

Generally speaking, however, this is not the case; and the woman infant pines and wastes under irritative fever marked by a rapid pulse, much nervousness, disturbed sleep, copious perspirations, languor of body and hebetude of mind, symptoms which are most intense, just before and just after menstruation.

The indications are, 1. to remove local excitement; and, 2. to sustain the powers of the constitution.

The body during the period should be kept in the horizontal posture in absolute repose. After this is over, all those remedies should be resorted to which are useful in certain forms of menorrhagia which are elsewhere detailed; those which repress the local action; those which bring up the debile and flagging frame to that degree of vigour which permits it to sustain the premature waste; and, in the majority of instances, this will readily ensue if the faulty education of mind and body, or the local ailments and irritations be remedied and removed.

2. *Tardy Puberty.* Puberty may be tardy as well as precocious, but the mere absence of the menstrual flux is not a positive sign of the absence of the capacity of conception. Sir Everard Home relates the case of a young woman who was married before the age of 17, and who although she had never menstruated became pregnant. Four months after the birth of her child she became pregnant for the second time, and four months after the second delivery she was pregnant for the third time; after this she menstruated for the first time, and continued to do so for several periods, when she conceived for the fourth time. Kleeman mentions the instance of a woman who being married in her twenty-seventh year bore eight children before she menstruated; the periodical flux then took place and continued regularly till her fifty-fourth year. (*Rust. Mag.*, b. 18.) These and similar facts are to be regarded however as rare, and as warnings against unnecessary medication, for it is not the absence of the menstrual flux, but its ab-

sence when the general health is suffering that constitutes the case for medical aid. When tardy menstruation is the result of feeble constitutional power, the treatment is the same as for amenorrhœa, which is elsewhere detailed.

3. *Faulty Development.* A class of cases answering to this head, may be collected from most of the better works on physiology and pathological anatomy. The individuals constituting it, termed androgynes, have the traces of feminine character, overpowered in the frame by those of a masculine kind, without any deviation, however, in the form of the sexual organs: the voice is rough, the mammæ undeveloped, and the thorax hirsute; there are the broad shoulders, the flat breasts, the narrow hips, and the beard of the male, with a portion both of his vigour and the harshness of his character; the internal organs of generation in these persons are small; they are sterile usually, and prone to phthisis.

Suspended Menstruation or Amenorrhœa.

1. The menstrual flux may be suspended in certain states of the constitution compatible with the healthiest condition of frame, as in pregnancy and during lactation; and here it is but an example of a very general law, that increase of the intensity of one function is accompanied by diminution of that of some other. It is not because the os uteri is closed during gestation that there is no flux, for it is in those who have borne many children, in many instances, quite open; and even if closed, the menstrual discharge might, like common hæmorrhage, be contained to some extent between the membranes and the uterine walls; but it ceases to flow because the function of gestation suspends that of menstruation, suspends it, however, only in part, in the majority of instances. For it will be found that the periods at which the patient would have menstruated had she not been pregnant, are marked by a nisus, as it has been termed, which very sensibly affects her frame. All the sensations which precede the eruption of the discharge in the unimpregnated state, are felt in the impregnated, and, in some instances, even the discharge takes place periodically during the whole of utero-gestation. All abortions not caused by sudden injuries occur, for the most part, during what would have been a menstrual period, and all labours commence at one; both these conditions being determined by the *molimen ad menstruationem.* Hence the prevention of abortion depends very much on a knowledge of this fact, and on having recourse to that kind of treatment which shall allay at this period the periodical excitement, and regulate the actions which tend to disturb the uterus. In those prone to abortion, who are of a plethoric habit, a few leeches applied at this critical moment, with the exhibition of a saline aperient, followed by a sedative, together with the horizontal posture and a spare diet, will ward off the evil of premature decay of the ovum. In the nervous and debilitated a different procedure is demanded; but these being subjects pertaining to the diseases of pregnancy, it is sufficient, in this place, simply to point out the fact of the influence of the function of menstruation, even on the impregnated state.

The suspension of the catamenia during lactation is scarcely marked by any disorder of the frame. The incessant secretion of milk seems to have the same power of allaying, though more efficiently, the periodical constitutional excitement caused by the menstrual nisus, as when it is quelled artificially by bleeding or by purging. When, however, the flux appears during lactation, it may, in many cases, be augured, even though the nurse attempts concealment, by the effects on the infant, who is generally affected by vomiting, diarrhœa, or colic, and not unfrequently by convulsive fits. When a healthy nursling is suddenly and unexpectedly indisposed, the nurse should be questioned as to the catamenia, that the milk may be changed if requisite.

The suspension of the catamenia by organic disease takes place chiefly after such disorders as strike deeply at the nutritive process, such as chronic disease of the intestines or liver, phthisis, and in hydropic affections. In most disorders of the heart, and in ovarian dropsy, there is menorrhagia. In

both these cases, the curative indications pertain to the original malady, and not to the disturbance of the menstrual function.

2. In practice we meet with two forms of *Amenorrhœa*, or obstructed menstruation, dependent on disorder of the reproductive function: the one attended with constitutional debility, the other with the appearance of superabundant circulation.

In the former kind the symptoms show, 1. a languid circulation; for the face is pale, the hands and feet habitually cold, the pulse small, weak, and if not quick, easily quickened. They show 2, muscular debility; for quick walking is followed by breathlessness, and exercise of all kinds soon fatigues. They show 3, torpor, or inequalities of the nervous function; the mind is lazy, and the spirits low and uncertain. They show 4, defective nutrition; for the body is lean, and the appetite bad. This state steals on the patient so insidiously that months elapse before medical aid is resorted to. The cessation of the menstrual discharge is very gradual. It usually is scanty or pale, and nearly serous, or defective both in quantity and in colour; then it becomes irregular, prior to its cessation: when allowed to proceed uninterruptedly, Amenorrhœa terminates in *Chlorosis*; a state of constitution characterised by the following group of symptoms: — The complexion looks waxen or cadaverous; the upper eyelids are brown, while the lower are lead-coloured; the general surface of the skin is harsh and dry, and slightly suffused with a sallow bilious tinge; the stomach is the seat of unwonted sensations and diseased cravings; the bowels are at one time constipated, at another tormented with painful diarrhœa; the head aches under light and sound, and the mental faculties are altered; the breath is fœtid, the tongue rough and sulcated; the fauces pale, or striated with pencils of capillaries. There is œdema of the lower extremities in the evening, and of the face in the morning; together with such shortness of breathing, and so scanty a secretion of urine, as to lead to the suspicion that the lungs participate in the œdematous condition of the rest of the body. The very aspect of the patient is sufficient to prove the great alteration which the fluids have undergone, without our seeking support for the opinion from the authority of Dr. Marshall Hall, who has seen the epistaxic flow scarcely tinge the linen; or from the theory of MM. Roche, Sanson, and Blaud, who fix the essence of the malady either in the deficient stimulant properties of the blood, together with an asthenic state of the vessels, or in the preponderance of serum. Whatever theory we may adopt, whether that of Cullen, which makes the disease dependent on some peculiar state of the ovaries, or that later development of it by M. Gendrin, which connects menstruation with the formation and escape of an ovule from the Graafian vesicle, or that of Dr. M. Hall, who traces it to "Disorder of the General Health," or to the opinions above quoted; the practical fact is this, that there is scarcely a single solid texture or a single fluid which is not altered from its healthful condition. The nervous and the vascular systems, though not equally, are simultaneously disordered, and no organ escapes from the pressure of much functional derangement.

In the second form of amenorrhœa girls attain to the age of puberty without menstruating, or having menstruated cease to do so, and yet retain all the appearance, corporeally and mentally, of vigorous health. The complexion is florid, the frame well nourished and plump, indicating the probability of a local cause for the deficiency of function. The girls are subject to giddiness and headach, a sense of fulness about the loins, and the general signs of plethora. Many explanations have been given of this state, but though specious they are scarcely satisfactory. It is one of those many facts which are better known than understood. Some, in accounting for it, have asserted that the amenorrhœa originated in the want of consent between the organ which secretes, and the constitutional powers which prepare the fluid; an explanation which is but another mode of stating the same thing. Others have accounted for the deficient flux, by assuming some local inefficiency under the vague term of *rigid uterine fibre*, which simply amounts to the expression of a be-

lief that there is some local obstruction neither definite nor intelligible. Carus in his *Gynækology* has the following speculation: He says that a certain state of relaxation is requisite for the performance of any secerning function, as evidenced in the relaxation induced by syncope as being favourable to perspiration; that caused by fear in promoting the secretion of the kidneys and bowels; while on the other hand, where there is over-active vascular effort there secretion ceases, as in the example of the vascular impetus of fever inducing the dry hot skin. Now in the amenorrhœa, accompanied by plethora, the deficiency in the secerning process is dependent, or may be so, on the over-energetic action of the vascular system.

This analogy may probably account for some of the forms of amenorrhœa, but is insufficient for explaining the instances where sudden emotion, in a healthy person, not only suspends but suppresses for months the catamenia.

Complications. To one or other of these two states very many local ailments or special disorders are attached. Their variety and intensity show how deeply the function of menstruation influences the whole frame.

1. *Disorders of the vascular system.* In the amenorrhœa of debility it has been asserted by Dr. Marshall Hall, Blaud, and indeed by the majority of authors, that the brunt of the malady falls on the blood, which becomes so altered as to present but few of its healthy characteristics. Chlorosis, therefore, may be looked on as a deficient hæmatosis. Whatever be its origin, this is one of its most important results. The want of the due stimulus in each organ is followed by all those reactions which succeed great losses of blood, and which are admirably described by Dr. Marshall Hall. There is intolerance of light and sound, and an aching brain, confusion and even delirium when the head is affected. There are sudden attacks of what appears to be pleuritis or pneumonia, as far as dyspnœa and pain are concerned: often the chest suffers, or there is exquisite tenderness of the peritoneum if this organ be affected. In all these the suddenness of the attack, its liability to shift or to cease, the previous history, the relief afforded by opiates and nervines, with depletion merely as accessary, point to the real nature of these attacks.

Besides these diffusive affections, defective hæmatosis, accompanied as it always is, by all the signs of deficient nutrition in the solid structures, is followed by a weakened state of the heart and bloodvessels, deserving of great attention. Most unexpectedly these patients will fall down apoplectic, and effusion of blood or serum will be found in the brain, and the heart thin and pale. The defective state of the organ, and its inefficient propelling power, give rise to congestions, inasmuch as the blood is not forced back into the heart. The bloodvessels lose their elasticity, and become passively distended. Hence the liver is gorged, and the motions tinged with exuded blood: hence the anasarca of the extremities. There are in these cases very remarkable modifications of sound, heard on auscultation. The valvular sounds of the heart are those of deposit upon, and contraction of these parts, while the peculiar droning noise, known as *bruit du diable*, may be heard in the course of the large veins.

It is wonderful how readily this state of the vascular system is remedied by steel, and how speedily the heart regains its force under the treatment rigidly enforced for anæmia, namely, light and digestible animal diet, much fresh air, regular foot exercise, wine and steel. M. Blaud has stated that similar conditions of frame are remedied on an average in three weeks.

There is a different form of modification of vascular disease which we will venture to term *congestive amenorrhœa*, in which the capillaries are chiefly in fault; and that, not from any defect in the heart, or great vessels inducing mechanical distension, as in the last case. The patient's fingers are patched with purple as affected by chilblains, or, what is as common, the leg is covered with fine vessels. The surface so affected is hot and dry and painful, and hence the patient is more or less lame; sometimes there is exudation of black blood under the skin, which soon peels off, leaving a thin pellicle of dried

cruor which falls away, and exposes a red and painful surface. This state of the leg, for it rarely affects the upper extremities, may last for several months. It is always worse when the periods should appear, and becomes an index of the constitutional effort. We have in many instances found the patient, so affected, perish of phthisis.

2. *Disorders of the digestive organs.* Besides the general disorders above mentioned, the stomach is very often the seat of peculiar uneasiness, noted by the patients as indescribable: sometimes they attempt to liken it to pruritus, sometimes a sensation of sinking and exhaustion. With these states, the appetite is variable, or there is a disordered longing for inedible substances, such as sealing-wax, brown paper, coal, chalk, slate pencil, and even dirt.

Another state of the intestinal canal accompanying amenorrhœa, is its partial distension in the neighbourhood of the uterus, so that the abdomen has the exact shape of that of pregnancy, while the morning sickness, capricious appetite, together with the cessation of the menstrual discharge has not unfrequently led the practitioner into a belief that such might be the fact. This class of cases may be detected by an accurate knowledge of the signs of pregnancy.

3. *Spasmodic affections of the involuntary muscles.* The whole of the intestinal tube, from œsophagus to rectum, may be the seat of spasm. In its severest form we have the very acute disease known as *hysteric colic*, in which, with intense abdominal agony, we observe great though temporary disorder of the mental functions. A milder form, and a very common one, is marked by great irritability of the canal, with much rumbling of wind, and sometimes with incessant noise as if of the splashing of water. The œsophagus may be spasmodically affected, forming *hysteric dysphagia.*

These spasmodic affections may occasionally attack the heart; when in a mild form there are various grades of distress, from simple palpitation to severe angina. In a severe form the patient will be suddenly killed, as the following case, detailed to the writer by Mr. Green of St. Thomas' Hospital, proves: — A young lady who had for some time been hysterical was attacked by peritonitis, from which she was not relieved by depletants; the pain subsided spontaneously, but soon after cerebral disorder arose; one day she exclaimed suddenly that flames were rushing to her brain, and fell down dead. On inspection, it was found that the cerebellum was pale; the cerebrum and its membranes slightly injected; the right side of the heart was completely gorged with blood. On the left side, however, not only was the ventricle quite empty but spasmodically contracted, and this was looked on as the active cause of death. A rope of mucus hung from the os uteri. The Fallopian tubes were dark with black blood; several Graafian vesicles were ready to burst; the hymen was entire.

A case of a similar kind is mentioned by Dr. Bright: the source of irritation however, was a calcareous deposit on the fimbriæ.

4. *Spasmodic affections of the voluntary muscles.* These are not uncommon accompaniments of functional disorder of the uterus. They are enumerated here, not because they invariably accompany amenorrhœa, for sometimes the mere discharge is not wanting, but because they are obviously connected with the constitutional nisus at the period, for these are the times when they are either aggravated or are called into existence. The muscles of a limb become and remain contracted in so great a degree as to be forced into the most constrained and unnatural positions. In others, a larger section of the muscular system is subjected to spasmodic action. In one instance that came under our care, the shoulders were for months spasmodically drawn up to the level of the ears, and such was the whimsical sensibility of the nervous system, that the limbs were involuntarily jerked out at the sound of street-music. In the majority of these cases, together with excessive irritability of the muscle, there is positive lesion of the faculty of volition, which prevents them from vigorously willing an act. Some require the shock of terror to force them into

necessary exertion. There often is difficulty in evacuating the bladder, and the rectum.

Chorea, or St. Vitus's dance, the most general disturbance of the muscular system is rather a precursor of puberty than a common complication of amenorrhœa. It is, however, very often connected with functional disturbance of the uterus; for, of its subjects three-fourths, according to Heberden, are girls between the age of ten and fifteen, the disease yielding with the establishment of the menstrual function. The nervous excitement and vascular erythism which arise during the development of puberty, are the conditions most favourable for inducing chorea: hence, in those rare cases which are fatal, the heart is either inflamed, or there is apoplexy or fatuity, or softening of the spine. (*Med. Gaz.*, 1831.)

5. *Affections of the nervous system.* Besides those affections of the great cavities of the body which simulate pleuritis, peritonitis, and phrenzy, the limbs and joints are subject to acute and chronic forms of pain, which seem to portend disorganisation. In some the bone is the seat of pain, likened to that caused by the gnawing of dogs; in others the joint exhibits the signs of ulceration; in a third class the painful affection resembles, in its agonising effects, tic douloureux, and the knife has been resorted to, where steel, in a less formidable shape, would have been the more beneficial remedy.

The mind may be, and generally is, disordered in its faculties or emotions, in most cases very slightly, in others in a more marked form. Of the slighter grades, mere irritability may be carried to such an extent, that a hitherto happy home is broken up from intolerable captious caprices. Of the graver kinds of lesion, the most common forms of functional aberration are met with: 1. as disordered instincts or appetites; 2. diseases of some of the intellectual faculties.

Of the first kind, we have already noticed disordered appetite, impelling the patient to swallow greedily the most nauseous substances. Of emotions, the commoner forms of aberration are exhibited in causeless dislike, or vehement and sudden affection towards individuals, who have neither provoked the one nor invited the other.

In some instances it is impossible to account for the insane gratification arising from disorder of emotion.

One of our most reputed physicians was called to see a young lady who vomited large quantities of urine. He was informed by the patient, and by her attendants, that the only remedy for this strange misplacement of function was bleeding, but that this had been so often done that it could not without danger be continued, an inference readily made from the blanched cheek and feeble pulse of the patient.

The consulting physician at once declined acceding to the urgent entreaties of the girl, who accordingly soon vomited large quantities of a fluid which was proved to be urine by a celebrated chemist. The patient was ordered to be watched night and day, no bleeding being allowed; when it was soon ascertained that the kidneys performed their functions regularly, and that the bladder became so painfully distended in the usual time, as to cause the patient to request the ordinary relief.

She confessed that she had deceived her medical attendants, solely to induce them to bleed her, adding that the operation was attended with indescribable pleasure, and to ensure this, she swallowed her urine, so as to impose on them more readily with her incredible tale.

A not uncommon form of aberration of emotion is a diseased desire for sympathy or wonder, and rather than not be the sole objects of attention, these monomaniacs carry on with great ingenuity a long series of frauds. In one instance the patient nearly fell a victim to this diseased passion, pretending total inability to eat. When reduced to a skeleton, when neither any sustenance was ever known to have passed her lips for weeks, nor any evacuation of the bowels discovered, it was determined to try the efficacy of a stream of cold

water on the head, in arousing hunger, while a basin of hot soup was at hand to gratify it, should it arise.

The patient resisted the shock the first day. On the next, when the bucket was larger and the dash threatened from a greater height, a very little soup was asked for on trial, which was not found intolerable, and from that hour the rebellious stomach soon regained its powers.

6. *Affections of the intellectual faculties.* We have seen two forms of mania accompanying menstrual disorder; the one constant, the other intermittent. The constant form differs in no essential from mental aberration, arising from common causes: it has all its varieties of delusion, whether of exaltation or depression. In the intermittent form, the patient is maniacal only during the time of the discharge, the mental disorder beginning with the eruption of the menstrual flux, and ceasing as this subsides. In a few instances, the return to sanity was incomplete, so as to be rather remitting than intermitting mania.

Both the constant and the intermittent forms differ, however, in one important feature, from mania arising from other sources, viz. on the essential point of cureability. There are but few examples in which mental disorder, dependent on menstruation, has not been cured in our experience. The intermittent form, however, may last several years, and is less tractable than the constant.

There are other and rarer affections of the nervous system called forth by menstrual disorder, which we shall simply enumerate. 1. Ecstasy, or motionlessness depending on intense mental exaltation. 2. Catalepsy, or loss of volition, in which action is solely dependent on mechanical causes, externally applied. 3. Trance, or lesion of the functions of animal life. 4. Somnambulism, or intense sleep of some of the senses and faculties, and intense wakefulness of others, the phantasy being possessed by a vivid dream. 5. Anomalous action of the senses, as hallucinations, visions, affections determined by particular odours or certain sounds.

Treatment. In amenorrhœa attended by debility, the best way to excite the uterus is to strengthen the constitution, and the best remedies are such as improve the general health. As there is almost always in these cases disorder of the digestive organs, the treatment should commence with a brisk mercurial purgative, followed up by a course of warm aperients of a milder kind: two grains of calomel, and four to eight of scammony, may be given once a week and the aloetic pill on the other days. But the chief remedy for a radical cure is steel in some of its various forms.

The difficulty experienced by most patients in tolerating this medicine arises from the extreme susceptibility of the nervous system, which causes the exhibition of steel to be followed by headach, a sense of fulness, bleeding from the nose or even from the lung, and a wearing fever.

There are, however, two modes of exhibiting this remedy, by which these inconveniences may be obviated: the one is to combine the steel with an aperient, the other to begin with the minutest doses. M. Blaud says that the carbonate of iron is the most efficacious form, and that on an average amenorrhœa is cured by it in 21 days.

The muriated tincture is the strongest, and the vinum ferri the weakest, of the preparations of iron. The course of steel should be carried on for eight weeks, omitting the period in which the patient should have been unwell, and during which the attentive practitioner will remark the constitutional disturbance created by the nisus. During the whole period of using chalybeates, an aperient of Dec. Aloes Comp. variously modified should be used; and if the biliary system be in fault, mercurial alteratives conjoined with iron (Plummer's pill and compound iron pill) will be found of singular use. The invigoration of the constitution may be furthered, 1. by diet; the food should be the lighter kinds of meat proportioned in quantity to the powers of digestion: 2. a moderate use of wine: 3. exercise, so as to keep the patient as much as possible in pure air, yet not so as to fatigue and waste her strength;

foot and horse exercise are preferable to carriage: 4. a residence in the country away from the wearing excitements of a town life: 5. bathing, shower bathing, at first with warm, then tepid, and at length with cold water; in cases of great debility simple sponging is sufficient: a cautious use of sea bathing.

In the plethoric form of amenorrhœa, marked by signs of a disturbed circulation in an otherwise healthy frame, the treatment required is precisely the reverse to that which has been just noticed. The uterus must not, as in the former case, be stimulated, by filling and stimulating the system. The indications are, 1. to use such agents as act on the uterus without stimulating the constitution: 2. to relieve the general or local plethora, until menstruation takes place.

Under the latter indication, blood should be abstracted in small quantities from the arm, especially at the expected period. Should this be objected to, blood may be abstracted from the loins by cupping, or the application of leeches, and the aperients should all be of a saline nature producing watery evacuations. In those who are subject to periodical hæmorrhages, we have found that these may be commanded by a draught of two ounces of the infusion of roses, two drachms of salts, and twenty minims of the tincture of hyoscyamus, to be taken every night, for a few days just anterior to the expected attack, which, as before remarked, will be when the menstrual flux should have occurred.

The diet should be spare, and wine and fermented liquors proscribed. In some obstinate cases of plethoric amenorrhœa, a milk diet will be found very beneficial.

For exciting the action of the uterus, the chief means are the following: they apply to both forms of amenorrhœa: — 1. warm hip baths, and especially at the expected period; they should be used for half an hour at least: 2. aloes, and such medicines as stimulate the rectum, and excite sympathetically the uterus: 3. supposed emmenagogues, such as hellebore, savine, and electricity; the last is the best of direct applications.

There are numberless nostrums of greater or less value, which, from their very number, prove how capricious a disease is amenorrhœa, and how curable. Dale excites the mammæ, by repeated application of one or two leeches; the organ enlarges greatly, and the uterine sympathises on being thus aroused. Very many authors give five to eight grains of ergot. Carron des Villard recommends cyanuret of gold in minute doses: Bradley gives strychnine: Brera, iodine: Amussat applies an exhausted glass to the uterus: and Rostan leeches.

It is impossible to give a sketch of the treatment of the various complications of amenorrhœa which, though rooted on the general malady, form specific diseases requiring the specific treatment which is detailed in other places.

Obstructed menstruation may depend on local conditions of the uterus. After menstruation has been thoroughly established, it may be and often is suddenly suppressed in a healthy woman, not pregnant, by various causes, of which the most distinct in their effects are cold and mental emotion. When menstruation is interrupted by cold or fright, it may be either near and is prevented, or has commenced and suddenly stops; in both cases there ensue symptoms indicating more or less distinctly an inflammatory state of the uterus, and the usual sympathetic disturbance in the constitution: there is fever, nausea, or vomiting, tenderness of the abdomen extending down the thighs, a quick pulse, hot skin, and throbbing headach. In the severest forms, we have known death produced in a few days, and inspection has proved it to have been brought about by phlebitis. In a milder form it may terminate in chronic enlargement of the uterus, or in a condition of the uterus unaccompanied by any sensible disease save of want of discharge. The treatment for acute suppression is the same as for phlebitis, viz. general or local bleeding, warm applications, mercurial aperients followed by sudorifics. For chronic enlargement, the

remedies which apply to chronic metritis are beneficial here, as mercurial alteratives, repeated leeching, frictions of tartarised antimony, &c. When there is amenorrhœa, which in these instances is termed chronic suppression, it is accompanied by one or other of the two states of constitution already noticed, and demands for its cure the remedial measures already discussed.

Menstruation may be mechanically obstructed by any malformation impeding its egress. The impediment may exist in any part of the vaginal canal, from the external orifice to the occlusion of the os uteri. There is a swelling of the abdomen or of the perineum, or of both parts, according to the site of the occluding membrane. There are at first symptoms of periodical colics with much pain, very similar in character to those of labour; to these succeed increased size of the abdomen; after which the signs of absorption of morbific matter into the system, viz., hectic or irritative fever, wasting, delirium, dusky hue over the surface, great debility, and death. The uterus and vagina are found distended, sometimes enormously, with the menstruous fluid in various grades of alteration. In Mr. Friar's case thirty ounces gushed out on the first incision. (*Med. Facts and Observ.*, vol. viii.) In Dr. Sherween's, twelve pounds were evacuated. (*Duncan's Med. Com.*, vol. ii.) In the former instance the discharge was quite liquid; in the latter, ropy and of the consistence of treacle; in others the watery particles have been still more absorbed, leaving a gritty deposit in utero. In a few cases the matter was putrid, although secluded from atmospheric air. In Dr. Sherween's case the patient must have been menstruating internally at least fourteen years, in Dr. M'Kormich's about seven. (*Duncan*, l. c.)

There are cases in which the vaginal canal is imperforate without being accompanied by any of the disorders just described. The obvious and indeed the only remedy is the knife, and the sole practical question is, What are the cases fit for it?

A patient in the prime of life consulted Morgagni for an imperforate vagina. She said she had never menstruated, had never been subject to lumbar or dorsal pains, and it was obvious that her general health was good. Morgagni found a septum about one third up the vagina, closing the canal. His reasonings on the propriety of an operation may be taken as presenting the particulars for judgment in all similar cases; it is eminently sagacious and practical: — "Having considered all these things, and hearing, not only that this woman had never had menstrual discharges, but not even any uneasiness nor pain tending thereto, nor even the slightest beginning of them; and, on the other hand, seeing that she was endowed with very good health, colour, and strength, as every healthy woman is at that time of life which may be considered as the prime, I began to suspect that, as she was without a continued and open canal, or orifice of the vagina, she might be perhaps, also, without a uterus from the original formation; so that if the obstacle could even be removed by the scalpel, there would nevertheless be danger, lest the bladder or some one of the intestines, lying in contact with it, in consequence of the uterus being absent, should be pierced through at the same time. I therefore persuaded this woman placidly to suffer her marriage to be dissolved, which had been improperly contracted, rather than imprudently submit to the operation." (*Let.* xlvi. art. 2.)

Of this species of malformation the examples are sufficiently numerous. Where the uterus is wanting, the ovaria and Fallopian tubes are also absent, the place of these organs being supplied by a cylindrical mass, from one to three inches long, and one inch thick, or by a closed sack. (Meckel, *Path. Anat.*, b. i. p. 59, &c.) There are examples of operations attempted and discontinued. Thus Nabothus mentions, that "a physician attempting to remove with a knife a coalition of the vagina which had been from birth, was obliged to desist when he saw the coalition extending very high and the large vessels appearing, and his opinion is, that when there is a fleshy interstice, it is better to abstain

from the incision of it, partly on account of the very great hæmorrhage, and partly on account of the subsequent inflammation."

Denman was consulted in a case of imperforate hymen. He advised the friends of the patient to allow the menstrual flux to collect, and thus let nature herself demand the operation, and at the same time show the best point, at which to make the incision. From these, and similar facts, we may conclude that not every case of imperforate vagina is fitted for operation; that especially we should hesitate if there never has been any sign of menstrual excitement in the system; and if in the frame there be the signs of absence of the ovaria and uterus, as flatness of the mammæ &c. and the other characteristics of sexual deficiency which have been enumerated. On the other hand, if there has been a succession of attacks occurring at the end of the ordinary menstrual intervals, if there be a tumour above the pubes or at the perineum, we are called on to advise an incision. If the imperforation be near the orifice of the vagina we may always operate; if higher, care is demanded; and if very high, we should be quite certain that there is a uterus, and that the incision or puncture be in the direction of that viscus. If the operation be postponed until the general health shall have suffered, the chances of recovery are much diminished.

Whenever the contained fluid is much altered, the uterus is not speedily evacuated; and then the secretion is apt to become putrid on the access of air. Much of the success of the operation depends on relieving, by repeated injections of warm water, the uterus from the contact of the matter. In some instances the uterus has suffered irreparable mischief from ulcerative disease of its inner tunic.

Vicarious Menstruation.

For instances of this curious subject the reader may consult Sauvages, Cullen, and Mason Good, in their several works on Nosology. Numerous examples are scattered, also, among our periodicals. We have known the vicarious discharge to occur from the lungs, the stomach, the rectum, and from sore surfaces of the skin. The fluid differs from the true menstrual discharge in being common blood, but authors have noticed differences of aspect and odour which have assimilated the secretion from the vicarious surface with that of the uterus in a great or less degree of affinity; nothing positive on this point, however, is made out. Authors have enumerated examples of vicarious menstruation from the eye, ear, nostrils, stomach, intestine, sockets of the teeth, lungs, mammæ, bladder, and skin. It is probable that it is always or nearly always determined to a mucous surface as giving an outlet.

The treatment is regulated by two indications: 1. to excite the uterus to resume its natural function; 2. to guard the organ which is burdened with this unnatural effort. Bleeding just before the expected attack, to the amount of about four to eight ounces, and purging with saline aperients a week prior to it, will convert the case into one of amenorrhœa, or greatly moderate the vicarious afflux to the organ unwontedly labouring, while the known means of exciting the functions of the womb may be resorted to in the intervals.

In the cases of vicarious Hæmatemesis or Hæmoptoe which have fallen under our observation, the lung and stomach were either diseased or ran the hazard of being left so. The specific treatment will vary according to the organ attacked, as that determines the kind of reaction caused by the irritation. The greatest risk to life is undoubtedly from vicarious Hæmoptoe, and yet by the plan of moderate purging just anterior to the monthly period, the patient survived three years with comparatively slight expectoration of blood; at the end of which time, having died, we found one lung contracted into small dimensions from an old pleuritic attack, but without any signs of tubercle on either side.

The state of the organ had probably assisted in determining the discharge to it, just as when the skin is ulcerated the vicarious flux will be seen to exude monthly from the diseased rather than from the sounder surface.

Painful Menstruation, or Dysmenorrhœa.

Symptoms. Pain in the loins, commencing a few days before, or just previous to, the menstrual eruption. The umbilicus and the pubic region are tender on pressure, and most ease is obtained by the recumbent posture. These pains vary in their character and intensity, from constant soreness to agonising dartings or colics: they are mostly remittent. The stomach and bowels are rendered irritable, there is vomiting, or diarrhœa with tenesmus, and the urine is generally passed with scalding pain. In the more severe forms the nervous system gets much disordered, and either syncope or hysteric convulsion, or even catalepsy may occur. These symptoms increase in intensity until the eruption of the menstrual flux, and then suddenly or gradually cease, or simply decrease. The flow of blood is often scanty, but by no means always so.

Causes. No defect nor organic lesion is discoverable even in the most severe forms of Dysmenorrhœa. That the malady is connected most intimately with the menstrual function, is apparent from the fact of its never affecting the female, either before puberty or after the cessation of the menstrual function, and from the consideration that it is always during the period that it subsists. Dysmenorrhœa has been divided by many authors into inflammatory and neuralgic: and to these two varieties, Dr. Churchill in his Work on the Diseases of Women has added a third, viz. that dependent on mechanical impediment to the menstrual fluid. While we acknowledge that in a certain number of instances the vascular system is chiefly in fault, as in others the nervous functions are disordered; while we would lessen the impetus of circulation in the former, and adopt, very often, contrary measures for the latter, we are by no means satisfied that true inflammatory action constitutes any part of Plethoric Dysmenorrhœa. What would be the state of an organ which for years laboured four or five days, in every twenty-eight, under the violent symptoms supposed to be inflammatory dysmenorrhœa? we have no instance of any other viscus of the body so suffering without accession, sooner or later, of disorganisation of its texture, and yet such a termination rarely or never is the result of dysmenorrhœa. Again then, this supposed inflammation, not only after repeated attacks does not disorganise texture, but is remittent in its action. If it is not an inflammation *sui generis*, it must be compared with other diseases, such as gout and rheumatism, which attack organs from time to time at distant intervals, but with these maladies the analogy also fails in the main point, namely, that they, unlike dysmenorrhœa, disorganise texture. We prefer therefore the not involving ourselves in the theory which the term Inflammatory Dysmenorrhœa implies, and the rigid practice it should induce.

It is true that a not uncommon effect of dysmenorrhœa is the formation of coagulable lymph, modelled to the shape of the inner surface of the uterus: this has been supposed to be the effect of inflammatory action. Practically, perhaps, it is safer to consider it as the result of irritation, for antiphlogistic remedies are not in every case the best for preventing its formation. It should also be remembered, that the uterus is especially organised to pour forth lymph under certain irritations of the internal organs of generation, as when conception takes place, whether that be uterine or extra-uterine, the inner surface of the womb is lined by the plastic fluid. Whatever be the analogy between this action and that of inflammation, the diversity is still greater; and, unless we are prepared to say, that metritis and pregnancy are convertible terms, we are warranted in placing the single phenomenon of the effusion of lymph, common to both states, under different causes. We are inclined to believe therefore that the membrane formed in utero, in some instances of dysmenorrhœa, results from a local condition, which may practically be more safely designated irritation than inflammation; and that, as in the ovary serous cysts are more readily formed than in any other part of the body, from a deviation of the natural functions of that organ, so spurious decidua is more readily deposited in utero under

certain irritations from a deviation of its functions. The readiness with which either the uterine membrane, or the ovarian cyst is formed, being deducible in both cases from the natural tendencies of either organ.

The exciting causes of dysmenorrhœa are many, but in general all such as excite the nervous system, more especially such as exalt the sensibilities of the uterus. Thus the emotions of terror or joy, coincident with the menstrual period, have been known to produce dysmenorrhœa. Thus too the venereal congress, immediately previous to the expected flux, has excited the severest forms of this malady. In other instances, causes which have lessened the discharge suddenly have produced a state of uterine sensibility, which has terminated in dysmenorrhœa.

The *prognosis* is favourable, as to danger to life: as to sterility, it is not unfavourable; though they who are severely affected do not readily conceive, and when they do so are prone to abortion. As to curability, the majority are cured. There are a few, however, who resist all the known means of alleviating the intense suffering incident to the malady, and are relieved only when the function of menstruation ceases.

Treatment. As in most of the maladies of menstruation, the treatment requisite is applicable, 1. to the period, 2. to the interval between two. During the periodical attacks the pain may be relieved in various ways. Just before the eruption of the menstrual flux, when symptoms of plethora are present, one of the most efficacious means of lessening pain is local depletions, which may be resorted to by means of leeches or the cupping glass. The case however should be recognised as decidedly one admitting depletion; with or without this, the appearance of the menses should be solicited by tepid, or hot, or vapour baths, for, generally speaking, a marked amelioration takes place, when the flow from the uterus is established. The great remedy however, in lulling excessive pain, is opium, and in cases of real anguish a full dose should be given and repeated. We have found a mixture of laudanum, and tartarised antimony in minute doses, frequently repeated, of singular benefit. We have also used stramonium with the most marked good effects in the more severe forms of dysmenorrhœa. Colchicum, in our experience, is not equal either to opiates or to stramonium. In general, then, we may say, that, 1. anodynes, 2. depletion, and 3. warm local applications, are indicated in the paroxysms of dysmenorrhœa; and that these may be combined, or separately used, according to the nature of the individual case. The acetate of ammonia has been much lauded by M. Patin; ergot of rye has been found beneficial; and there are but few practitioners who have not some remedy, or combination of remedies, supposed to be efficacious in removing the distress of this malady; a proof that the paroxysm subsides spontaneously, or that it is in the majority of cases easily remediable.

During the inter-menstrual period, the chief remedy to be relied on is a course of steel. Here, as in all the functional disorders of menstruation, it is a most valuable medicine for producing the radical cure. Where the patient exhibits the neuralgic form, it may be at once proceeded with. Where there are signs of a disordered circulation, this should be regulated by bleeding or cupping, and a bland unexciting diet; and then the steel will usually effect a cure in two inter-menstrual periods. With respect to the treatment of the variety of dysmenorrhœa, dependent on mechanical impediment, Dr. Churchill recommends dilatation of the narrow orifice of the uterus by a bougie, and cites an instance supporting the efficacy of the treatment. We are not prepared to admit the existence of the form of malady mentioned by him. It is difficult to trace the connection between the effect alleged and the cause assigned. Obstructed menstruation acts by distending the uterus, and so exciting labour pains. The mere narrowing of the os uteri would not interfere with the exit of the fluid, slowly as that fluid is formed during the menstrual period, and therefore would not, we believe, cause accumulation in utero. If it did, the symptoms should be referred to obstructed menstruation, a totally different malady from dysmenorrhœa, having nothing in common with it but the fact of painfulness,

The remedy recommended by Dr. Churchill in his elaborate and useful volume, namely the introduction of a bougie, would be in our opinion beneficial in many cases of dysmenorrhœa, not however as removing obstruction, but as altering the action of parts, just as many states of irritable urethra in the male are cured by catheterism. However, the objection to the use of a similar means in the female, considering the age in which the malady is most rife, is all but insuperable.

Excessive Menstruation, or Menorrhagia.

We include under this term only those uterine hæmorrhages which are directly or indirectly connected with the periodical flux, omitting such as arise as a symptom of uterine structural disease. The quantity of blood discharged at each menstrual evacuation varying in different women, Menorrhagia exists only when there is disproportion between the loss and the power of replacing it. If with the usual daily flux the periodical returns be shortened, or the time of the flux be lengthened, or if there is a larger quantity evacuated, although neither the interval between the periods nor the duration be altered: we have menorrhagia. It is the relative quantity lost, and not the absolute, which constitutes the disease. An abundant menstruation must not be confounded with a disordered one. The former retains its periodicity, its quantity, and its quality, and does not deteriorate the general health. The latter is irregular, and leads to disease.

Causes. Heated rooms, too warm clothing, warm bathing in excess, all are known to determine to the uterus. In the tropics menstruation is not only early but copious, while in the frozen zones the discharge is both late and scanty. Mechanical irritations, excessive venery, some of the pathemata, as fear or anger, are predisponents to uterine discharge. Various diseases, especially those which interfere with the free circulation of the blood, as diseases of the heart, asthma, and such as affect the circulation in the vena portæ, also diseases of the ovaria, uterine polypi, are mostly followed by menorrhagia. In some affections of the fluids, purpura for example, the drain from the uterus we have known occasion death. In some anomalous irritations of the ovaria and Fallopian tube a similar event has occurred. The late Mr. John Shaw examined a young lady who, while in full health, was suddenly seized with menorrhagia accompanied by a succession of fainting fits, under which she succumbed. A large mass of coagula was found in the abdomen, but the source of the hæmorrhage was a mystery until the Fallopian tubes were laid open, and then it was discovered that, for the space of about an inch and a half of one of them, its lining membrane was pointed with bloody spots from which the fluid found in the peritoneum had rapidly been poured out. These kinds of hæmorrhages are essentially similar to those from the membranes of the brain or nostril, or lung, in which mechanical lesion of the bloodvessels is rarely found. Certain kinds of exercises, as equitation, mechanical impediment to the free circulation of the blood, such as that which is caused by tight lacing, will give rise to menorrhagia or increase the tendency to it.

In nervous women emotion will very speedily determine a menorrhagia of a very terrific character. Latterly, M. Trousseau (*Journ. des Connaiss. Med. Chir.*, Dec. 1838) has assigned chlorosis as one of the causes of menorrhagia. The blood he says is altered and attenuated by menorrhagia in the first place, and this attenuation, in its turn, becomes a source for furthering the flux. He remarks that this cause is a common one in married women, and uncommon in virgins. In twelve cases nine of the former class were affected to three of the latter.

With regard to the *symptoms*, there is the prominent one of excessive discharge followed by the consecutive effects of loss of blood on the constitution. The natural menstruous secretion becomes mixed with large clots; there is in many signs of increased activity in the uterine circulation, a sense of heat and weight,

and throbbing. These signs usher in the discharge, and are its precursors. There is a sense of pressure in the pelvis, feverishness, irritability, and an uncertain state of the digestive organs, vomiting, and constipation, or diarrhœa. If during this stage of the disorder the uterus be examined, it will be found turgid and considerably enlarged, and in chronic cases the finger is smeared with blood which stagnates in the texture of the womb.

The *prognosis* varies according to the cause: where there is a healthy uterus and no peculiarity in the constitution, the vast majority of persons affected with menorrhagia recover. Where, however, there is uterine irritation or disease, or where the flux is dependent on the state of the heart or lung, the probable result must be determined by the aspect of the primary malady. In chronic cases the constant loss of blood brings the constitution into a state very favourable to the development of any acute general disease, or for disorganising the uterine texture.

Forms of Menorrhagia. There are two forms, the *acute* and the *chronic;* the former occurs with all the symptoms we have noted, and with complete intermissions. The latter is marked by constant oozing rather than gushing of blood, by the signs of general debility rather than of fever and hurry of circulation, and by a deeper disorder of the general health as well as of the uterine tissue. The occasions in which menorrhagia is most common are, 1. It is very generally coincident with the menstrual period; when it is not, either it is dependent on some uterine malady, or on some impediment to the general circulation; or it is the result of the nervous temperament put into violent emotion. 2. It occurs as a sequela of parturition. The natural congestion after childbirth is a strong predisponent to excessive uterine flux, and repeated abortions and pregnancies determine very decidedly to the vascular system of an organ whose anatomical structure is already favourable to hæmorrhage. 3. It occurs as a symptom of the perturbations of what has been termed the critical age. The suspension of uterine function is preceded by irregularity of menstruation, both as to time and as to quantity of discharge. 4. It occurs after undue lactation. 5. It occurs anterior to puberty. 6. It is symptomatic of many diseases. When the flux cannot be traced to obstruction of the circulation, or to any visceral or general malady predisposing to hæmorrhage, we must look on it as dependent on a cause which, under the vague term of irritation, appears to have its seat in the nervous system. The most obvious example of which, and the most familiar, is the suffusion of the cheek by the emotion of shame or its blanching by the passion of fear. Here we see how the nervous power directs the flow of blood unequally to certain tissues, while the more mechanical impulse of the heart, however strong, could only pump it, in the largest quantities, where the recipients for the fluid were of the amplest caliber.

In certain exanthemata, perhaps in the erythema of gout, in many shifting erubescences of the surface, this suffusion becomes more permanent, but still retains its connection with the afflux of irritation rather than that of inflammation, by its not changing the structure of the part injected. By thus looking through vascular movement, we are enabled to trace a gradation of disease from simple and transient distension of the capillaries, to alterations of structure accompanied by effusions of fluid in the form of blood, or its constituents, or of new combinations arising out of these endowed with specific powers. In this view, however, medicine has rather seen the chain than proved its linking, for great gaps in the continuity of our knowledge are felt.

Menorrhagia unconnected with structural disorder, whether uterine or not, is chiefly found in two kinds of constitution: the nervous, and what may be termed the lymphatic. Although stated as existing in those in full vigour, our own experience affords us few examples of the robust being menorrhagic. In the nervous temperament, marked by extreme mobility in all the sensations and emotions, characterised generally by rapid muscular movement, and a thin frame and pallid surface, the gushes of uterine hæmorrhage follow agita-

tion of all kinds, and are incredibly great. The wonder has been, how they were consistent with any health. In the second kind of temperament, which we have termed the lymphatic, the persons are disposed to be bulky, and even florid, but they have no muscular strength: they are readily tired, and the capillary circulation almost stagnates in bright red patches in the cheek, or pencils the skin of the limbs with a slender vascular fringe. These persons faint on small abstractions of blood, and are much exhausted by the periodical flux.

Treatment. There are three circumstances which modify our views in treating menorrhagia: 1. whether it be simple: 2. whether it be dependent on some visceral or some constitutional malady: 3. whether it be connected with uterine structural disease. If simplicity of arrangement were always most useful, we might reduce these to two, by ascertaining whether the flux was idiopathic or symptomatic. The three questions, as above stated, lead more directly, however, to a definite conclusion, and therefore to more precise remedial action.

It is to simple or idiopathic menorrhagia that the following rules of treatment are especially directed, although they are not inapplicable to the symptomatic with some modifications.

The first thing to be attended to in menorrhagia, whether acute or chronic, is absolute repose in a horizontal posture. From a known law of hydrostatics, namely, that the pressure of fluids is as the height of the column and not merely as the quantity of liquid matter composing it, it is certain that the pressure of a column of blood, extending from the heart to the uterus, must be greatly lessened by placing the body horizontally The pressure is in fact reduced to that of a column of blood whose height is that of the diameter instead of the length of the containing vessel.

Accordingly we find that in the majority of cases of incipient acute menorrhagia, the assumption of the horizontal posture is alone sufficient to check the flux, and even to cause its cessation. The laws of dead matter, however, are modified in the living frame, and in other instances this is but a palliative, though it is true it is one of the first class. The afflux of blood to the uterus is to be checked by agents acting on the causes which have either produced it or keep it up. The vascular and nervous systems are to be constrained in their inordinate movements. For this purpose, we possess, as to this malady especially, three great remedies; aperients, depletion, and cold. We have found a purgative composed of sulphate of magnesia and infusion of roses, with twenty-five minims of tincture of henbane, of very great service in both chronic and acute menorrhagia; it acts both as a revulsive and as depleting the bloodvessels. To be efficacious, it should be given over night so as to ensure four to six watery evacuations in the morning. This draught may be used every night, but it should most especially be resorted to the week before the expected menorrhagic period.

Depleting is of the same nature in its action as the purgative plan, but not so universally applicable. A few ounces of blood, drawn from the arm shortly before the eruption of the flux, will almost invariably stop its inordinate flow; but in one instance we witnessed a violent hæmatemesis succeed the diminished uterine discharge, and in most women the remedy creates much nervous perturbation. In those of full and injected habit of body, in those where the uterine congestion is accompanied with much lumbar or inguinal pain, with throbbing and heat in the vagina, and a tender state of the uterus on contact, it is not only indicated but should be insisted on. Where these symptoms occur in a debile and flaccid frame, cupping on the loins, or, what is best of all for every case, a few leeches (one to four) applied to the cervix uteri by means of the leech tube should be resorted to instead of general bleeding.

During the period of active discharge the medication should be cooling, and the diet unexciting, and the loins and hips should be sponged with cold vinegar and water. Cold in a more determined form is rarely required during the active flow of blood, except where the menorrhagia amounts to flooding, and

then the treatment is in every respect the same as for that formidable accident in an indistensible uterus, viz. the plug, and cold so as to diminish the temperature of the bleeding part. Where the excessive discharge takes place in the nervous temperament, the aperient plan is better than the bleeding. A few leeches may be required however, but the modification, chiefly necessary in this class of cases, is the use of such remedies as quell inordinate nervous action, and such a regimen as shall ensure repose to the nervous system. A Belladonna plaister should be applied to the loins, and opiates may be administered with the greatest benefit, either as enemata or in the usual mode. All emotion, all excitement, should be most carefully avoided, and the body should be kept as free from stimulus as the mind from perturbation.

To these general means we may add two classes of remedies which are supposed to check the flow of blood: these are astringent injections into the uterus, and the use of certain medicines, which act, or are said to act, as styptics. No astringent should be used for the first few days of the period. We should wait until the constitutional effort is established, until the secretion is converted into an hæmorrhage, known by gushings of blood instead of oozings, by a clotted instead of a fluid discharge, and by the absence of constitutional excitement. It is when this has ceased we may resort to alum or sulphate of zinc, or to the vegetable astringents. As to such as stop the blood as styptics, we have found alum in eight grain doses taken in syrup of ginger among the best. We have resorted to the secale cornutum in doses of eight to eighteen grains thrice a day with decided advantage. Its effects differing from styptics are unequivocal, and may be injurious if continued when a sense of tenderness over the pubic region is excited by it.

The various kinds of acids are most efficacious when the menorrhagia is connected with that kind of disorder of the fluids attending scorbutus or purpura. Trousseau, in the paper on the *Menorrhagia of Chlorosis*, recommends pure lemon juice during the day in the milder cases, and ergot of rye in the more severe. The latter remedy will be found most efficacious at night, when, as he very justly remarks, the gushes of blood are much more copious than during the day. One dose should be taken on going to bed, and a second, if possible, in the early morning. Medicines containing tannin, as catechu, rhattany, are said by most authors to be of much avail.

Such are the means for quelling the excess of discharge in impetu; but what are the modes of preventing its recurrence? Where in simple menorrhagia, the previous discharge has weakened the frame but not removed the congestion of the uterus; where the functions are languidly performed; where there is a feeble rapid pulse, and a fretful fever uncertain in its attack; where there is a slow and laborious digestion; where the external surface is pale and the lips bloodless, the constitution will require corroborants during the intermenstrual periods, while the congested uterus may with advantage be depleted by one or two leeches; and this two-fold medication is not contradictory. The loins and hips should be well sponged, and the patient directed to sit for a few seconds night and morning in cold water placed in a shallow vessel. When there is the state of body just described, the best corroborants are steel and quinine. Those persons who exhibit what has been noted as the lymphatic temperament, bear these medicines better than those who are nervous; but even in these this treatment is beneficial, provided it is resorted to in diminished force. To this last class, pure country air, shower bathing, and those adjuvants well known as diminishing nervous action, must be resorted to.

When the disease is chronic, that is, when there is oozing of blood almost always present, in small quantities, with occasional gushing; when exercise even of a gentle and ordinary kind will produce the discharge, it has a great tendency to disorganise the uterine texture. The womb will be found large and heavy in the early stages of the chronic malady; still however it retains its shape, and the relative proportions of its parts. In the later stages the cervix uteri becomes most congested and bulges, so that the whole organ is more in

shape like an hourglass of unequal bulbs, rather than that of a pear. This is a pure effect of gravitation of blood to the most dependent part. If examined by a speculum the cervix is of a deep sanguine hue, smooth but not tense, and shining and dry and painful as in inflammation of this part. In extreme cases the texture is infiltrated with blood, and small clots and scales of cruor adhere to the outer surface of the neck of the womb. Chronic menorrhagia may have these consequences: 1. sterility; 2. prolapsus uteri; 3. it readily leads to a succession of slight inflammations of the womb, known by heat and pain in the part, and by sympathetic nausea or vomiting; 4. it has a tendency to lay the foundation of organic alteration, especially if it occur at the period termed critical.

The treatment for chronic menorrhagia is based on two indications: 1. the state of the organ; 2. the state of the general health. The organ must be unloaded, and at the same time its congested vessel strengthened. All those remedies which prevent the afflux of fluid to the part, or remove its superabundance, and all such as give firmness and vigour to its fibre, must be resorted to: 1. slight local depletion; 2. counter-irritants to abstract the diseased action; 3. the use of such agents as are known to diminish the bulk of parts, viz. tartarised antimony, rubbed in as an unguent, but so as not to create pustules: or iodine; 4. astringent injections cautiously used; 5. sedulous attention during the natural menstruous periods, so as to diminish in every mode the uterine flux, which, however natural, only increases the local malady.

With regard to the general health this soon becomes deeply injured by chronic menorrhagia. There are all the effects of loss of blood added to all those which result from want of exercise and the habits of confirmed invalids. These cases are most difficult to treat, requiring patient attention for a length of time and incessant watchfulness: the majority however recover. When death takes place it is induced either by direct hæmorrhage, of which we have seen but few examples; or by diseases awakened in a frame rendered apt for their reception, or by uterine disorganisation.

IRRITABLE UTERUS, OR HYSTERALGIA.

Symptoms.—Diagnosis. — Prognosis. — Treatment.

UNDER the term Hysteralgia, Dr. Gooch first described a painful disorder of the uterus, which, in its symptoms, and the sufferings consequent on them, simulated some of the fatal diseases of this organ. As little or nothing has been added to his masterly essay on a malady, which is as difficult for the patient to bear as for the practitioner to cure, the reader is referred to the original paper, of which the following observations may be looked on as a brief abstract. Many of the persons who were the subjects of this malady came, after Dr. Gooch's death, under our care: we can therefore corroborate, in every particular, the accuracy, while we admire the force of his descriptions.

Symptoms. There is pain in the loins and round the brim of the pelvis, which, while it is incessant, yet is subject to aggravations, especially after mental excitement or bodily exertion. A few days before, or a few days after menstruation, these paroxysms of anguish come on. In one instance, the middle of the inter-menstrual period was always the time in which the patient was most urgently affected. The constant uneasiness, with occasional exacerbation, soon induces the patient to give way to the relief afforded by repose, and to stir rarely from the sofa. The result is that the general health is broken by the worrying pain, the want of fresh air and of due exercise; and a languid circulation, constipation, and some of the complications of dyspepsia, are superinduced. In very few cases is the pulse permanently excited. The catame-

nia at first are unaffected, but subsequently cease as the constitution becomes more debile.

If the uterus be examined, slight pressure will give rise to exquisite pain, which will continue for some time after the removal of the cause. We have found the cervix uteri in most instances puffy and swollen, though without any of the characteristics of scirrhus or other malignant disease, while the vagina is invariably in a healthy state. The persons most liable to the malady are the young or the middle aged; rarely, or never, old women. A large proportion of Dr. Gooch's patients had been subject to dysmenorrhœa, and most of those affected were of a nervous and very susceptible temperament. The *exciting causes* are generally some undue exertion at a period when the uterus is susceptible. Violent jolting, long standing when the catamenia are present, will give rise to the malady. In one instance an astringent lotion, used to check profuse lochia, produced this affection.

Diagnosis. Hysteralgia may be confounded with acute or with chronic inflammation of the uterus, but the absence of enlargement, heat, and throbbing in the organ, the slight alteration of texture contrasted with the intensity of suffering, the stationariness of the symptoms, and the length and course of the malady, are sufficient guides by which hysteralgia may be distinguished from affections which have a tendency to produce disorganisation. It might be mistaken for prolapsus, did we not find that this is completely relieved in all its symptoms by the recumbent posture, when the irritable uterus is only rendered less painful. From the periodical pain of dysmenorrhœa, it differs as to the fact of the suffering being constant. The nature of the malady, therefore, must be inferred to be nervous, from a comparison with painful affections of other parts of the frame, which are characterised by much and long suffering, unaccompanied by organic change. Sir Benjamin Brodie has described these under the term of Local Hysteria, and Sir Astley Cooper has given instances of painful mammæ, which might readily have been mistaken for incipient cancers. The various joints, the spine, the breasts, may be the seat of acute pain more or less constant, enduring for many years and yet never interfering with health of structure.

The *prognosis*, therefore, is always favourable as to life, not quite so as to ultimate recovery, and never so as to a speedy return to health. The majority, however, do recover completely, and all are much relieved.

The *treatment* is based on two indications, 1. to subdue pain, 2. to sustain the general health. When the paroxysms of uterine pain are brought on by even moderate exertion of body, we are compelled to enforce the horizontal posture and absolute repose; but this treatment should not be rigidly adhered to for any length of time, as the nervous irritability, the dyspepsia, and the general health are all unfavourably influenced by it. Even when repose is most strictly enjoined, the patient should be carried into the open air when feasible. The local pain is often mitigated by narcotics, which may be applied to the lumbar surface in the shape of a belladonna plaster, or by friction of the linimentum saponis medicated with opium; or a pill composed of one-third camphor and two-thirds of extract of hyoscyamus, may be taken thrice daily, or injections of acetate of morphia (two to four grains in the ounce of distilled water) may be thrown into the vagina night and morning; or all these various means of influencing the nervous system may, with advantage, be simultaneously resorted to in the more severe forms of hysteralgia. The vapour of steam, or a warm hip bath not of so high a temperature as to stimulate the uterus, will often procure ease. Local bleeding has sometimes been resorted to by Dr. Gooch, and repeated according to the circumstances of the case; but, for the use of this and similar remedies, that sagacious practitioner had the aphorism, That we should cease to employ them if the constitution, rather than the disease, seemed giving way.

All active purgation is invariably injurious in hysteralgia, as never failing

to induce a paroxysm of pain. Counter-irritants are of very doubtful use. A generous diet, but so as not to burthen the stomach, fresh air, a gradual and sustained course of steel, and narcotics locally applied, are the best means of attacking this capricious and obstinate disorder. The worst are low diet, the constant supine posture, close confinement and depletions, whether by purgatives or by bleeding. With the former, the malady will be subdued or will subside; with the latter, the health, and even the life of the patient are endangered.

There is a painful state of the vagina which we have frequently met with, which appears to be allied to the affection of the uterus just described. There is neither discharge, nor inflammation, to account for the anguish produced by contact, even of the finger; the inner membrane is not discoloured, nor tense; nor unlubricated, nor, in short, in any way deviating from its natural state, save in the fact of a painfulness so excessive, that walking is intolerable, and coitus is not unfrequently followed by a fit of hysterics. All the patients whom we have seen were married, and of extreme nervous susceptibility; in some the painful condition of the vagina came on subsequent to the birth of a first child, and they never conceived again; in others this state was developed by marriage, and was not removed by repeated childbirths.

This malady is to be distinguished from irritable granulations which sometimes succeed ruptures of the perineum, and from chronic inflammation of the vaginal walls. The absence of ruptures in the one case, and of hardness and paleness of the lining membrane of the vagina in the others, are sufficient guides for diagnosis. The treatment is, in the main, that for Hysteralgia.

LEUCORRHŒA.

Acute and chronic forms. — Symptoms. — Causes. — Treatment.

A WHITE discharge, issuing from the vagina, and unconnected with structural disorganisation of the genitals, has usually been defined as constituting leucorrhœa. The fluid discharged varies in colour, consistency, and quantity. In colour, from that of a thin solution of gum-arabic to that of pus, which itself may be tinged greenish, or brown, or slightly red; in consistence, from that of limpid water merely, to that of a tenacious, ropy substance, mixed with a thinner liquid; in quantity, from a slight increase of the natural moisture, lubricating the mucous membrane, to several ounces in the twenty-four hours.

Various divisions have been made by way of classification, which throw some light on the nature of the malady. Dewees refers leucorrhœa always to some local disease, generally inflammatory. Pinel has a vicarious, a constitutional, and an accidental variety. Then, to these, other authors add a syphilitic, a critical, and a dyspeptic leucorrhœa. The source of the discharge, whether uterine or vaginal, has given rise to another mode of classification.

For practical purposes the division of leucorrhœa, into acute and chronic, appears not to exclude the more elaborate ones, founded on the supposed causes of the malady, or its situation, or nature, while it at once points to a variety in the main object, namely its cure.

We shall not enter on the subject of contagious discharges from the vagina. With regard to the vicarious variety of leucorrhœa it may be stated, we have known a colourless discharge supersede the menstrual flux, and be accompanied by all the symptoms of the periodical secretion; that the suppression of evacuations, to which the constitution has been inured, has been described as being followed by leucorrhœa; on the other hand, a sudden cessation of vaginal discharge has been succeeded by a large flow of pus from the bronchial membrane and by death. (*Locock.*)

Leucorrhœa may occur at any period of life; it is most common, however

during that comprised between the ages of fifteen and forty-five. Young infants and children are subject to acute attacks of vaginal discharge, accompanied by more or less of local inflammation; and here the mucous membrane of the vagina appears to share in the susceptibilities of this class of organs, common to this period of life, in which the intestinal surface is easily deranged, and always is more active than at any other stage of existence; when the lungs secrete copiously; and when the commonest form of acute pulmonary attack is that formidable bronchitis known under the name of bronchial fever, or the epidemic peripneumony of children; when the membrane of the nostril is also the seat of maladies unfrequent or unknown at a later age. The leucorrhœa of infants is very often a mere catarrh of the vagina, but most generally sympathetic of intestinal irritation.

In old age discharges from the vagina are comparatively rare, and should always be viewed as less innocuous than those of early life. In certain constitutions leucorrhœa is more common than in others. The luxurious excitements of the higher orders of society, where the nervous system is so much, and the muscular so little exerted, is very favourable to the development of this malady. Any thing which debilitates or over-excites the uterine system, will tend to produce it; and there are few disorders of the general health unaccompanied by some irregularity of the vaginal secretion. With regard to the seat of this disorder, pregnant women, in whom the orifice of the uterus is closed, are subject to leucorrhœa: hence we have direct evidence of its seat being, in these instances, exclusively vaginal. On the other hand, we are equally certain that the inner membrane of the uterus, when irritated by structural disorder of the womb, is capable of secreting matter not to be distinguished from that of common leucorrhœa. There is no reason, therefore, for doubting that other causes of irritation than those dependent on uterine disorganisation may likewise rouse the inner membrane of the viscus to unhealthy secretion. In severe forms of leucorrhœa, whether chronic or acute, the cervix uteri is rarely unaffected, being generally softer, larger, and moister, and not unfrequently more sensitive than natural. This portion, too, of the lining membrane extending through the cervix into the orificium internum uteri, is especially formed for active secretion; the palmæ plicatæ which radiate on it, and which in the progress of utero-gestation become so curiously developed, and in the progress of labour pour forth such a load of mucous secretion, prove by the inferences derivable from the structure itself, as well as the direct fact, that it can be the seat of active secretion, and therefore of deviation in its natural function.

In the majority of cases, however, we are inclined to believe that the seat of discharge is vaginal.

The forms of leucorrhœa are either *acute* or *chronic*. In the acute, the symptoms are those of inflamed mucous membrane; pain, swelling, heat; at first a thin exudation, like that in common catarrhal inflammation of the Schneiderian membrane; then thicker, and, lastly, purulent: with the establishment of pus the pain and swelling abate. The other symptoms depend mostly on the effect produced on the bladder and rectum, both of which are irritated. Difficulty of walking, excoriations, &c. are readily traceable to the situation of the inflamed organ, and to the character of the discharge. In some cases the constitution is affected with febrile excitement.

In the chronic form there is a variation in the symptoms, corresponding with the quantity and quality of the discharge. When the evacuation is large, the signs of debility, of dyspepsia, of a deficient hæmatosis, and of nervous excitability, supervene; to which there are added pelvic uneasiness, weight, or even obtuse pain. The flow of matter exhibits these peculiarities; it is generally imperceptible and continuous; sometimes, however, it is intermittent, that is, discharged in gushes, as in hæmorrhage; or it comes away mixed with masses of ropy mucus, as thick as that passed in chronic dysentery, or in the last stages of common catarrh of the nostril.

It is probable, that the intermission of discharge is a mere result of retention of fluid in the hollow and dependent parts of the pelvis, until the quantity overflows; in some instances, however, there is painful contraction, which the patient refers to the internal portions of the vagina, and which, whether uterine or not, we cannot determine. The mucous masses are, probably, secretions from the superior part of the vagina and cervix uteri itself, as it is in these structures that the mucous crypts and follicles are most developed; the purulent secretion with which it is passed, obviously having a different source, since the same part never casts off at the same time both pus and mucus.

Causes. This discharge is, in many instances, but an indication of the general vigour and activity of the organs of generation. It is compatible with excellent health, a full habit of body, and amounts only to a local inconvenience. The persons so constituted are, however, liable to pains in the situation of the ovaria, which endure many days with little fever, but great discomfort, amounting at times to agony. The paroxysms unite the characteristic of two maladies, colic, and circumscribed peritonitis; and, did the symptoms not remit, and thus for days remain stationary, instead of running the onward course of a pure inflammatory disease, we might be much puzzled. It is best relieved by local instead of general bleeding, by saline and not by aloetic aperients, and by anodynes. The above form of leucorrhœa must be considered as dependent on constitutional causes and on local irritability. There is a reverse state exhibited in the leucorrhœa of debility. In these the frame is weak, the vaginal folds ample, and much relaxed. A third class of causes depends on sympathetic irritation, arising from functional or structural disorders of the digestive organs. Obstruction to the return of blood, to the right side of the heart, will cause and keep up leucorrhœa. Diseases in the system of the vena portæ, or in the hæmorrhoidal veins, will especially do so. A fourth class of causes must be looked for in such as act purely locally, giving rise to irritations or inflammations of the uterine system. Dewees, who seems to consider all forms of leucorrhœa reducible to this last class, is certainly exclusive in so doing.

The *treatment* must, of course, have reference to the cause which produces the malady, to the state of the constitution, and to that of the organ. In the acute form of leucorrhœa the organ generally requires local depletion: a few leeches, tepid lotions, aperients, and a restricted diet soon allay the congestion of the mucous membrane, and then the treatment merges in that for the chronic form of discharge.

In chronic leucorrhœa the first thing to be assured of is the absence of local disease; of prolapsus, polypi, ulcerations, excrescences in the vagina or uterus. The next is to ascertain that the flux is not a symptom of oppressed circulation, or of disease in the abdomen, and especially of the rectum. When these causes have been eliminated, and it is made out that the malady is dependent on a local state, combined with disorder of the general health, we have the disease for which such a variety of empirical remedies are said to be successful. Nothing can be more variable than the shadings of disordered health; for in ninety-cases in the hundred, hysteria, in its Protean forms, mingles with leucorrhœa. In some there is inordinate nervous sensibility, in others torpor and inactivity; in a third, with general debility there is extreme nervous irritation in the uterine system, unceasing pruritus referrible to the uterus itself, or aching scarcely amounting to, but more intolerable to the patient than pain. In any grade or kind of chronic leucorrhœa, however, the uterus does not fail to draw into its sympathies the digestive organs. Strict attention, therefore, must be given to diet, exercise, and mode of life. A diet which is devoid of all excitement, and is confined to simple nourishment, without stimulating the stomach; pure air, and absence from those habits of late hours entailed by a life in the metropolis; are essentials to a speedy cure of the severer forms of chronic leucorrhœa: and with these prophylactics, all that regimen so well known as the dyspeptic, should be resorted to. The treatment for disordered

general health is not alone sufficient. In leucorrhœa, as in the other functional disorders of the uterus, steel is among the best remedies; hence the inveterate forms are most speedily cured at chalybeate springs, either at home or abroad. With this general attention to the constitutional treatment, the local affection must be locally attacked, first by extreme cleanliness, and then by anodyne, astringent, or alterative applications, together with such medicines as, when taken internally, are known to act on mucous surfaces. Of the local applications zinc, alum, the vegetable astringents, as catechu, cinchona, oak bark, the rind of the pomegranate, may be used so long as no tenderness, nor sense of weight in the pelvis be produced by them. If this be brought on it is a sign of uterine congestion in a slight degree; if it be further accompanied by evening or morning sickness, the congestion is of a more serious form. Anodyne injections of laudanum, poppy decoction, &c. are indicated when the leucorrhœa is accompanied by hyper-sensibility of the vagina and uterus. The class of applications, termed alterative, are such as disturb the secreting surface of any organ, such as mercury, a remedy proposed by John Hunter to be applied to the vagina on a cylindrical pessary; the Lunar Caustic (*Jewel*): or the Lapis Infernalis (gr 10 to ℥ j water) (*Ricord*): weak solutions of ammonia; and, in short, such agents as are known to disturb the secerning process of diseased surfaces. Every thing depends on the mode of application.

In the virgin state the leucorrhœa is rarely so intense as in married women, though, perhaps, more frequent; and to these local applications are rarely admissible, save as lotions.

In the married patient, a cylindrical pessary, made of sponge dipped in the proposed solution, whether astringent, anodyne, or alterative, may be applied, and retained, or speedily withdrawn according to circumstances.

With regard to the medicines which act on the utero-vaginal membrane through the general system, the best are cubebs, copaiba, cantharides (*Dewees*), the various turpentines, alum, uva ursi.

Besides these there is a long list of specifics, which are partly single medicines, partly compounds, resting on individual experience, unsanctioned by general use.

INFLAMMATION OF THE UTERUS, OR METRITIS.

Congestion of the uterus, and its treatment. — Acute metritis. — Anatomical characters. — Causes. — Symptoms. — Treatment. — Chronic metritis. — Various forms. — Ulcerative inflammation. — Suppurative inflammation. — Membranous inflammation — Inflammatory enlargement and induration of the substance and mucous follicles of the uterus. — Symptoms of chronic metritis. Causes. — Treatment.

Congestion of the Uterus. At the return of each menstrual period the uterus becomes the seat of a temporary congestion. Under the healthy action of the system this degree of congestion can scarcely be regarded as morbid, but it certainly borders upon that state; and on every slight derangement, either in the function or organisation of the uterus, it readily passes into a concretion which must be looked upon as a diseased state, which is *per se* of little moment; but it becomes a morbid condition of primary importance when considered in relation to its effects and in reference to the rank which it holds in the production, pathology, and proper therapeutic treatment of the diseases, functional and organic, of the internal female organs of generation.

By its monthly repetition it acquires, in the eye of the practitioner, a power which it would not otherwise possess, and exerts a great influence over the

course and treatment of all uterine affections. It is on this principle that we would explain much of the inveteracy of uterine diseases, and the inefficacy of the curative means employed in their treatment.

Diseased uterine actions, originally slight, are liable in their nature to be aggravated by the supervention of this monthly congestion, and more serious forms of disease are often prevented by it from proceeding to a healthy termination. Acute diseases, which were probably nearly subdued, are readily rekindled by its recurrence, and under the repetition of periodic excitement, such diseases are apt to become chronic. Chronic affections, on the other hand, are liable to undergo from the same cause, at each monthly term, a degree of temporary activity, and in each case the advantages that may have been gained by perseverance in the proper remedial measures during the time intermediate between the two menstrual periods, may be more or less lost during the next accession of the catamenial congestion.

It is on these grounds that even the natural state of menstrual congestion becomes an object of interest, and its importance is always increased when the congestion itself is rendered greater or more marked, as it so often is, by the existence of any functional or organic disease of the viscus.

It is unnecessary to dwell upon the pathological characters and terminations of congestion of the uterus. The congested organ is injected, swollen, has often an œdematous feel, and possesses all those others characters pointed out in the section on Inflammation, under the general head of *Morbid Congestion;* with this exception, that more frequently perhaps effusion of blood occurs from the congested vessels of the uterus than from those of most other organs under the same condition.

This tendency to hæmorrhage is always greatly increased by the presence of organic disease in the uterine parietes. The effused blood generally escapes from the free mucous surface of the organ, but it is sometimes retained and accumulated in great quantity in the uterine cavity, when the os uteri happens to be so obstructed as to prevent its exit.

In other cases it is accumulated within the cavity in the form of a solid laminated coagulum. It is rarely effused amidst the proper tissue of the uterus, except in the puerperal state, and in the last stages of malignant disease. Sometimes however, in females dying at an advanced age, the more internal layers of the uterine parietes are found injected, ecchymosed, and softened. In these cases the body of the uterus is generally alone the seat of the effusion, and the cervix remains unaffected.

The most frequent exciting causes of morbid uterine congestion certainly consists in the periodical determination of blood to the organ at each return of menstruation. It is at these times principally, and in some cases only, that the congestion accompanying an uterine polypus, or other organic diseases of the viscus, gives rise to actual effusion of blood from the vessels. Any cause tending to produce an unusual determination of blood to the part, may lead to the same effect, such as venereal excitement, strong mental emotions, exercise and fatigue in the erect posture, &c. A powerful predisposition to the disease is sometimes given by the frequent repetition of abortion.

The principal local symptoms, in cases of uterine congestion, are a feeling of fulness and weight in the uterine region; pains not increased on pressure, and generally of an intermittent character resembling colic and tenesmus; and, occasionally, discharges of true blood in greater or less quantity. Where the congestion has been of long duration, the uterus itself, when examined per vaginam, will generally be found enlarged, and low in the cavity of the pelvis, the os uteri patulous, and its lips swollen and spongy, but little if at all tender upon pressure; there is not, however, the increased heat of those parts as we find in cases of inflammation. The use of the speculum shows the discoloured and purplish state of the surface of the cervix and os uteri, and particularly of the lining membrane of the latter: occasionally an exudation of blood is to be seen upon it.

The constitutional symptoms of uterine congestion vary exceedingly in different cases. Slight febrile symptoms and alternate shivering and flushing are often present, with lassitude, headach, and sickness. Sympathetic pains are sometimes excited in distant parts of the body, particularly in the left hypochondriac region; and the mammæ occasionally enlarge and become irritable. In other cases variously marked, hysterical symptoms occur in connection with uterine congestion, and become aggravated at every return of it.

In itself morbid congestion is seldom a diseased state demanding direct medical interference. It is however, as we have already stated, of the greatest importance, as an almost constant complication of the other functional and organic diseases of the uterus. We need not discuss the general treatment of congestion, but shall mention only these peculiarities which congestion of the uterus requires in this respect; we allude particularly to that form of congestion which is so apt, in uterine diseases, to accompany and aggravate these affections at the return of the monthly periods.

Rest, in the supine posture, is one of the most important of the measures which we should adopt. It is not, however, to be regarded alone as a direct and effectual means of treatment, but, without it, all our other resources will in general fail. Its importance we can easily understand when we reflect how readily blood gravitates to the more dependent parts of the body, more especially if the general system happens at the time to be debilitated, or if the vascular system of any dependent organ is in so weak a state as to admit of congestion occurring in its vessels with more than usual facility. We assume, in fact, the supine posture here as one element in the treatment, for the same important reason as the surgeon insists upon it in the treatment of an injured, inflamed, or ulcerated limb; and we look upon it as an indispensable measure, during the period of menstrual congestion, as well as in the course of the active treatment of all uterine affections. It is sufficient, in many cases, to cancel the bad effects of the temporary uterine congestion, but where it is not, the detraction of blood either generally or locally becomes indispensable. The selection of local or general bloodletting must necessarily depend upon individual peculiarities, such as the state of general plethora and the strength of the patient's constitution. We have seen excellent effects from small venesections from the arm (to the extent of six or eight ounces) immediately before or at the commencement of the menstrual period, in cases where it was our object to avert the dangers of the accompanying congestion; and we have known similar good effects result from the application of a few leeches to the cervix uteri at the same period.

In constitutions so reduced or anæmic as not to justify the detraction of blood, dry cupping, or slight counter-irritants to the lumbar and dorsal regions may be employed with a similar indication, with such other means as keep the general circulation as much as possible equalised.

The treatment of hæmorrhage from the uterus, where it occurs as a result of uterine congestion, has been already detailed.

Acute Metritis. Metritis, or acute inflammation of the uterus, is a rare disease in the unimpregnated state: the more chronic varieties are however very frequently met with.

The morbid action may be seated in the serous or mucous coats alone, or simultaneously in these and in the proper structure of the uterus. Its effects upon the mucous and serous coats of this organ are similar to those upon the same membrane in other parts of the body. When it attacks the proper tissue of the uterus, the organ becomes enlarged, œdematous, and diminished in consistence. Sometimes, when the morbid action has been very acute, the inflamed part is soft and friable, with pus infiltrated through its tissue. Occasionally, instead of being diffused, the pus is collected in a cavity or abscess in the substance of the uterine parietes. This, however, is a very rare pathological appearance, and we have not seen more than one well marked preparation of it.

The purulent matter may occupy other tissues. Thus it has often been found in the veins, as well as in the dilated lymphatic vessels of the uterus. These appearances, however, have hitherto been only remarked in the puerperal forms of metritis; and in the epidemics of that disease which we have seen, the lymphatics were certainly more frequently the seat of the purulent deposit than the veins. Sometimes the pus, when effused on the mucous surface, is collected in the uterine cavity in consequence of co-existing obstruction of the os uteri; and again the purulent matter occasionally collects in abscesses limited by pseudo-membranes, the external surface of the organ, or in the cellular tissue between it and the rectum. The more frequent lesion on the peritoneal surface of the inflamed organ, however, consists of the effusion of coagulable lymph and false membranes binding the surface to the neighbouring parts, and leading often to sterility by obstructing the necessary change of position of the Fallopian tube and ovaries, or to abortion by preventing the development of the uterus beyond a limited extent.

Gangrene also occasionally occurs in the uterus as an effect of acute inflammation, but this is principally observed in the puerperal state, and when the uterus becomes the seat of inflamed and disorganising morbid deposits.

Causes. Suppression, partial or complete, of the menstrual discharge from exposure to cold, or the use of astringent injections, and mental emotions constitute perhaps the most common causes of acute metritis in the unimpregnated state. Abuse of sexual intercourse, physical injuries, and succussions of the lower part of the body, particularly if they have occurred at the catamenial period, are sometimes also observed to give rise to it.

Symptoms and Diagnosis. Sudden stoppage of the catamenia, a feeling of heat with tenderness on pressure in the uterine region, pain, and sometimes swelling of the cervix of the organ on vaginal examination, pains stretching to the loins and thighs, difficult micturition, a sense of weight and bearing down, and occasionally, after a time, abdominal swelling and tympanites constitute the more important local symptoms which severally or conjointly accompany acute metritis in the unimpregnated state. The constitutional symptoms vary greatly in character and intensity. They are regulated by the severity of the attack, but still more by the susceptibility and irritability of the system of the patient. In some cases there is well marked fever. Frequently the disease given rise to irregular hysterical symptoms, particularly in those who are subject to this affection, and nausea and vomiting are often present.

Occasionally in the more aggravated cases, headach and the more formidable symptoms of cerebral derangement, such as slight delirium, deafness, impaired vision, and even a tendency to coma, with great prostration and subsultus tendinum, supervene. These last symptoms are frequently observed in cases arising from sudden suppression of the catamenia, and we are inclined to think that they ought not so much to be attributed to any constitutional sympathy as to the retention in the circulation of the principles intended to be eliminated by the menstrual evacuation. We see, at least, similar symptoms produced when other excreted fluids (such as the bile or urine) are retained in consequence of inflammation, or other disease of their appropriate organs.

Treatment. This differs little, if at all, in its general principle from that which has been laid down so frequently in different parts of this work with regard to acute inflammation in other internal organs. We may state that, in general, we find venesection and the local detraction of blood well borne in these cases. Local depletion in this case is best effected by cupping the loins, or by applying leeches to the groin or vulva. We have at the same time frequently employed a combination of opium and tartrate of antimony (1 gr of opium and $\frac{1}{4}$ gr of the tartrate in the form of a pill) repeated every hour or two, till either the pain was abated, or sleep was procured. In some aggravated forms of puerperal metritis this practice has been followed by the best effects. In cases of the disease originating in suppression of the menses, antimony, acetate of ammonia, and other diaphoretics are often of much use: local fomen-

tations frequently repeated, the hip-bath, and other measures calculated to restore the uterine discharge being at the same time employed.

Counter-irritation by turpentine, mustard poultices, and croton oil, is preferable to that effected by cantharides, which sometimes aggravates such cases by its effect on the urinary bladder. The dysuria which not unfrequently accompanies acute inflammation of the uterus may be relieved by mucilaginous drinks, but can only be fully removed by the measures calculated to relieve the metritis itself. The bowels must be kept open by some of the milder cathartics only, in order to avoid undue intestinal irritation; and these, if necessary, may be assisted in their operation by injections of warm water, or any simple form of emollient enema.

Lastly, we would state as being a point of great consideration, that if once the disease is detected, our measures should be employed and pursued vigorously, in order to arrest the disease as early as possible, and to prevent its running on, as it is so very liable to do, into any of the different and distressing chronic forms of metritis that we have now to describe.

Chronic Metritis. Chronic inflammation of the uterus, from the frequency with which it occurs, is probably, in a practical point of view, the most important structural disease of this organ. The idiopathic form is exceedingly common, but it is also often found complicating various other organic diseases of the uterus, adding greatly to the distress created by them, and in many instances accelerating their progress. It is an affection to which too little attention has hitherto in general been paid; its effects and consequences, however, have received more patient investigation than the disease itself.

Chronic metritis may appear under different pathological forms: we shall in the present instance consider it in relation to the four principal varieties under which it is met with in practice, namely, as consisting of and terminating in 1. ulcerative, 2. suppurative, 3. membranous inflammation, and, 4. as leading to inflammatory enlargement and induration of the substance and mucous follicles of the uterus.

1. *Ulcerative inflammation.* We have seen ulceration of the inner surface of the body of the uterus result from acute metritis in the puerperal state; but when ulceration takes place as an effect of chronic inflammation of the organ, it is almost always confined to the region of the cervix. In this locality, chronic ulceration becomes important, from its occasionally giving rise to very distressing symptoms, and from its being frequently mistaken for disease of a more malignant character.

Chronic ulcerations, the result of inflammatory action, are generally situated on the vaginal surface of the posterior lip of the cervix, more rarely on the anterior, and we have found it occasionally appearing at, and as it were encircling, the very orifice of the os uteri.

At present we know little of the history of the first appearance of this disease, whether it originates in local inflammation and distension of the Nabothian follicles, or, as in the mucous membrane of the eye, in pustular or other forms of inflammation of the proper mucous membrane of the part. In some cases the ulcer is single, small, and circumscribed, with smooth edges; in other instances we see several ulcers present, or one large one of an irregular shape and of a diffused form. The ulcerated surface may be found either of a bright red colour like a healthy granulating sore, or the redness may be less marked, or, again, it may present a straw or yellowish colour.

The ulcer is generally very superficial, and hence it cannot, in some cases, be detected by touch alone; it may however extend, so as to eat more or less deeply into the substance of the cervix. The neighbouring parts are indurated, in proportion to the degree of chronic inflammation which accompanies the ulcerative process.

2. *Suppurative inflammation.* To this form of chronic metritis we refer almost all those cases of leucorrhœa in which the discharge proceeds from the mucous membrane of the uterus itself. The source of the discharge in these

cases is in general well shown by its aggravation immediately before or after the monthly term, and by its assuming at these periods a more purulent appearance, facts which do not hold good with regard to vaginal leucorrhœa. We refer for the more full discussion of this subject to the article LEUCORRHŒA, and shall only further remark here, that chronic suppurative inflammation of the uterus may be either an idiopathic affection, or may be excited and kept up by the presence of tumours, polypi, &c. in the walls or cavity of the uterus itself. When the os uteri happens to be obliterated by inflammation or other causes, the pus may accumulate within and distend the uterine cavity, a pathological appearance of which we have several cases on record.

3. *Membranous inflammation.* One form of chronic metritis is well-marked by its tendency to the effusion of coagulable lymph upon the mucous surface of the uterus. This lymph or fibrin may be thrown off in the form of shreds and laminated patches, but in general it is accumulated within the uterus to such an extent as to form, before its expulsion, a complete mould of its cavity. In some cases these fibrinous moulds are passed only once or twice during life, but in other instances they almost constantly collect during the interval between the menstrual periods, and are expelled regularly at every monthly term, or at more distant periods. When this occurs they give rise to one very painful form of dysmenorrhœa.

These false membranes often acquire considerable size, and by their accumulation distend the cavity of the uterus. They have often been mistaken for abortions: this error is the more likely to occur, in consequence of uterine contractions and pains, and sometimes a degree of hæmorrhage accompanying their expulsion. They want, however, many of the characters which distinguish the fœtal bag and membranes. They have no embryo in their cavity; and, what is still more important as a means of distinction, they show none of the villi of the chorion, nor are any of those small but numerous foramina peculiar to the decidua to be traced on their surface.

We have been led by various circumstances to consider the form of chronic metritis as much more frequent than it is generally supposed; and we have often found more or less distinct traces of it in uterine complaints, where the shreds and discharges were not remarked until the patient's attention was particularly directed to the subject.

This form of chronic metritis is analogous in its pathological characters to that sub-inflammatory action which occasionally gives rise to similar chronic fibrinous effusions upon the mucous membrane of the bronchial tubes, intestines, Schneiderian membrane, &c. In one case that was sometime ago under our charge, these fibrinous membranes were alternately discharged from the uterus and intestines. We have seen one specimen of a false membrane forming one complete fibrinous coat of the puerperal uterus, resulting from acute inflammation during that period; but such cases are exceedingly rare, and metritis with membranous effusion upon its mucous surface is almost peculiar to the chronic form of the disease alone.

4. *Inflammatory enlargement and induration of the substance and mucous follicles of the Uterus.* The effusions of serum and coagulable lymph resulting from chronic metritis may in this, as in other organs, be thrown out among the component tissues and structures of the viscus, and thus lead to their enlargement and hypertrophy.

Granular inflammation of the cervix, as it is termed, is one form of such disease. In this case, the mucous follicles, scattered over the cervix and at the os uteri, are distended with serous or fibrinous effusion, and project beyond the surface of the part. The disease has been described as a form of chronic metritis, consisting essentially of inflammation and hypertrophy of these follicles themselves; but the whole component tissues of the cervix are generally in an inflammatory state at the same time, and thus enlargement of the mucous follicles can only be properly regarded as one effect and form, and that not constant, of this diseased state.

There is another variety of chronic metritis to which the term granular inflammation has been applied. In this second form the effused lymph, instead of being infiltrated into the follicles or substance of the cervix, is thrown out on its mucous surface in the form of red granulations, like those seen in granular inflammation of the conjunctiva of the eyelids.

Sometimes the whole uterus is enlarged and hypertrophied from chronic inflammation, but more frequently this effect is more limited, and certainly the cervix is, of all parts, that which in the majority of cases is principally or alone affected.

Symptoms. When chronic inflammation or other forms of organic disease and irritation exist in the uterus, we may have symptoms referrible to several different sources present:—1. morbid derangements in the functions and state of the uterus itself; 2. derangements and sympathetic pains in the pelvic and other adjoining parts and viscera; and, 3. we may have a series of morbid phenomena, having reference to the effects of the disease upon the constitution.

In addition to these, there is in the class of diseases in question a further most important set of diagnostic signs to be derived from abdominal, rectal, and vaginal examinations, and by the use of the speculum.

In the different forms of chronic metritis the functions of the uterus itself are very rarely altered. Very generally, however, the peculiar mucous secretion of the lining membrane and cervix of the organ is increased, and it often alters more or less to a purulent character. At the monthly periods, the catamenial discharge is liable to be either partially suppressed, or in greater quantity than usual, and sometimes it is mixed up with clots of blood. When the membranous form of chronic metritis is present, there may be greater suffering from dysmenorrhœa at the time these membranes are discharged. In chronic metritis and most varieties of uterine organic diseases, the uterus itself seems always prone to a degree of prolapsus. Conception is in most cases impossible under the varieties of chronic metritis affecting the substance and lining membrane of the organ, and hence sterility is a very common consequence of the more inveterate varieties of this affection.

Nothing can be more various than the degree of local suffering produced in different cases by chronic metritis in the uterine region and neighbouring organs. In some instances, the several symptoms referrible to this head are almost entirely wanting, whilst in others, there are in a more or less marked degree a feeling of heat and weight, increased sensibility in the uterine or pelvic regions, sensations of tension and bearing down, dragging pains in the hypogastrium, loins, and thighs, and sometimes sharp or lancinating pain in the locality of the uterus itself.

These symptoms are relieved by the supine posture, and on the other hand are liable to be increased by long standing and fatigue. They are generally aggravated during the menstrual period. We often find also the urinary bladder and rectum much irritated and deranged in their functions, and occasionally we have deceitful sympathetic pains in these organs, as well as at the anus and vulva, or in the course of the lower extremities. In the more aggravated instances of chronic metritis, much constitutional irritation is sometimes produced. There are often present various dyspeptic symptoms, with headach and sympathetic pains in the mammæ, loins, and particularly in the left hypochondriac region. This last symptom (pain under the left mamma) we have observed to be a very constant phenomenon in almost all varieties of chronic uterine disease. Frequently these constitutional symptoms are complicated with those of hysteria, and occasionally, in the more inveterate cases, an impaired condition of the general constitution approaching to the state of cachexia is superinduced. This last is particularly apt to take place in the cases of the disease that are accompanied with much leucorrhœal discharge, or kept up by the constant recurrence of severe dysmenorrhœal symptoms.

Most of the symptoms which we have now enumerated, are common both to

chronic metritis and to other varieties of chronic uterine disease. By their presence, in greater or less number, we may probably be enabled to determine, in any individual case, that morbid action does exist in the uterus; but, in most instances, it will be impossible by them alone to ascertain the specific pathological nature of that action. No organ of the body shows less correspondence between the gravity of its morbid lesions, and the severity of the local and constitutional symptoms which these lesions excite. Thus there are sometimes much local and general irritation when only a small and simple ulcer exists on the cervix uteri; whilst, on the other hand, it occasionally happens that the uterus has undergone an extensive and advanced degree of carcinomatous degeneration, without giving rise to any phenomena that would lead us to suspect its existence. Hence arises the great advantage, in uterine pathology, of employing, as measures of differential diagnosis, such means as will make us acquainted with the physical conditions of the organ, namely, 1. manual or tactile examinations, and, 2. visual examination by the speculum.

In chronic metritis it is by vaginal examination alone, and through the medium of the sense of touch, that we can hope to detect the changes that usually take place, to a greater or less extent, in the physical conditions of different parts of the uterus, such as the tumefaction, and probably the induration of one or both of the lips of the os uteri, the patulous or funnel-shaped condition of that opening, the existence of ulcerative breaches of continuity in its neighbourhood, the increased sensibility and heat of the parts, and the frequent partial prolapsus of the whole uterus. Again, in the same disease, we have in the speculum uteri, not only a most valuable auxiliary measure for confirming several of the more important points ascertained by the sense of touch, but, further, it is through its employment alone that we can recognise the existence of the morbid inflammatory changes of colour at the os uteri and in its neighbourhood. Besides, by its use we may often recognise superficial ulcerations and granular elevations that are too slight to be detected by the most practised touch, and in all cases in which the disease is conjoined with a discharge, we may satisfy ourselves both as to its exact source and its prominent physical characters.

Great difficulties have been placed against the general introduction of the speculum into practice, in consequence of the revolting exposure of the person of the patient which is usually considered necessary for its employment. We have latterly in our own practice endeavoured to avoid this very natural objection, by teaching ourselves to introduce and use the instrument when the patient was placed on her left side in the position usually assumed in making a tactile examination. In this way we have found that the instrument can be employed with little, or indeed without, exposure of the body of the patient. We have made trials of many different forms of specula, and find, for almost all purposes, that of Ricord by far the most useful and manageable.

Causes. The causes of chronic metritis are such as induce the acute forms of the disease, more especially sudden suppression of the menses and other irregularities in the catamenia, injuries received in abortion or parturition, excessive sexual excitement, exposure to cold particularly during menstruation, physical violence, displacement of the uterus, &c.

Treatment. Till of late years no class of complaints were more generally mistreated than those arising from chronic metritis. Within a very recent period, the several consequences and principal symptoms of the disease were each looked upon as independent functional affections, and treated accordingly. In other words, remedies were applied, almost at hazard, to the effects of the metritis; and the leading phenomena of the disease were subjected to medicinal measures, whilst the metritis itself was neglected or misunderstood.

In no department of practice has the importance of the more accurate pathological views which have been acquired of late years been more forcibly illustrated than in reference to the present affection; and the great improvement which has at the same time taken place in our means of forming an

accurate diagnosis in uterine complaints has also, no doubt, greatly promoted this result. Thus, as we have just hinted, the particular forms of leucorrhœa, dysmenorrhœa, &c. which occasionally accompany chronic metritis, were formerly empirically treated, along with all the other varieties of the same nosological affections, upon some general and common rules, and without any regard whatever to the pathological state of the uterus on which they might be dependent. In other instances, again, the local diseased state of the uterus present in metritis, when it was really ascertained, was too often looked upon as of a malignant nature, and palliative measures were alone employed, when more active means might have restored the patient and arrested the progress of the diseased action. It is unnecessary to add how much our increased knowledge of the pathology and diagnosis is calculated both to improve, and at the same time to simplify, our prognosis and our principles of treatment. In fact, with the modern views of uterine pathology, a case of chronic metritis, instead of appearing under a variety of forms with a variety of diversified treatment adapted to each, simply resolves itself into a case requiring the application of those general principles of treatment that guide the practitioner in the management of other local chronic inflammations, with such modifications only as we have already pointed out (under Congestion of the Uterus) as required by its dependent position and peculiar functions.

We consider it unnecessary to state at length the detailed treatment of a local chronic inflammation, such as chronic metritis, inasmuch as the general principles applicable to this state have been already sufficiently laid down and discussed under different heads, and in reference to other internal organs. We shall therefore confine ourselves to a few remarks on this subject.

When the constitution of a patient affected with any of the forms of chronic metritis is in any degree plethoric, or can bear loss of blood without material constitutional harm, small derivative bleedings from the arm to the extent of six or ten ounces, will often prove of great advantage, particularly towards the recurrence of the menstrual period. We have pursued the plan of small general bleedings at the interval of a few days between each, in cases where local abstraction of blood was objected to, and have seen excellent results from it; but certainly we prefer, as a more effectual measure, the repetition of the local bloodletting, when that can be accomplished.

In uterine diseases it was formerly the practice to abstract blood locally when required, by cupping glasses to the lumbar region or sacrum, or by leeches to the groins or vulva. Certainly, one of the greatest improvements that has been introduced of late years into the treatment of these affections, and particularly of chronic metritis, is the adoption of a more efficacious plan of local bloodletting by the direct abstraction of blood from the uterine vessels themselves. This may be very readily effected by one of two plans, 1. by the application of leeches to the vaginal surface of the cervix uteri; or, 2. by making scarifications in that part.

We have employed the latter mode (scarifications of the os uteri) in several cases with such ease and effect, that we would be inclined to prefer it to the employment of leeches, if its adoption could be made less formidable in the idea of the patient. The blood is drawn more rapidly, and at the same time with much greater precision, from the engorged vessels themselves. The scarifications must be very numerous in order to be effectual, but they give surprisingly little pain to the patient, and indeed, in some cases, she can scarcely be said to be aware of their performance. We have generally used a sharp-pointed bistoury in this little operation, after having exposed the os uteri with a double-bladed speculum; and by keeping the vagina distended by the latter, three or four ounces of blood will escape in the course of ten or fifteen minutes. We have endeavoured to promote its flow by using the tubular speculum, and applying an exhausting cupping-glass to the outer extremity of it. Hitherto, however, we have not been able to make this addition of much avail.

In applying leeches to the os uteri, some practitioners are in the habit of

employing the speculum for the purpose of introducing them up to the cervix. We have found a tube of ivory or pewter, of ten or twelve lines in caliber, to be equally effectual, and it can be used without the necessity of exposing the patient. The tube is six or seven inches in length, and open at both extremities, and when fully introduced to the upper part of the vagina, the leeches are pressed along with a wooden rod. They generally fix readily and may draw a considerable quantity of blood. The hæmorrhage may be kept up after they are removed from the vagina by the use of the warm bidet or hip bath. The number of leeches to be applied, and the quantity of blood drawn as well as the frequency of the repetition of the local bloodletting, must be regulated by the circumstances and necessities of each individual case. We may remark, however, that the more actively and frequently the measure is pursued in those cases that are at all appropriate for it, the more marked will the effects of the treatment be. During the active stage of the treatment we have been in the habit of employing from three to six leeches every alternate or every third day, until the symptoms more or less completely yielded; and we have been repeatedly surprised at the good effects resulting from this practice, in patients whose apparently debilitated and impaired general state of body might *à priori* have seemed entirely to forbid it. In some of these instances the great relief derived from each repetition of the local bleeding, and expressed by the patients themselves, has encouraged us to proceed in it when otherwise we might have hesitated to do so. The small general and local bleedings that we have spoken of, should after a time be followed by blisters or other counter-irritants to the neighbourhood of the diseased organ. We have generally been in the habit of applying them to the region of the sacrum, and it is a point of much importance that this counter-irritation should be either frequently repeated, or kept up in the form of a continuous discharge. For this purpose, strong stimulant liniments may be applied to the lumbar and sacral regions, croton oil or nitrate of silver may be rubbed in upon these parts, a tartar-emetic eruption brought out, or any form of issue opened. If cantharides be used, they must be employed in such a way as to avoid irritating the urinary bladder.

Along with these active means other antiphlogistic measures require to be adopted. The extent and nature of these must be regulated in a great degree by the circumstances of each individual case. In all, it is a matter of the highest importance to restore and keep up a healthy degree of action in the skin and intestinal mucous surface, and to avail ourselves as much as possible of the advantage to be derived from keeping the patient in a recumbent posture.

There is a period in this as in all other forms of chronic inflammation, when tonic and slightly stimulant measures may be advantageously substituted for those of a strictly antiphlogistic character. Hence we find authors describing the benefit they had experienced in the treatment of cases (which are now known to have been chronic metritis) from preparations of mineral and vegetable tonics. In the latter part of the treatment, the cold hip-bath or cold affusion upon the loins will be found to be an excellent local tonic. It is always of importance that the lower extremities of the patient should be kept warm and equally clothed.

In the ulcerative and granular forms of chronic metritis, the use of astringent, stimulant, or sedative washes of different kinds, or the employment of the solid nitrate of silver or sulphate of copper, as direct local applications to the affected part, are of the greatest advantage. In one case of large irregular ulceration of the cervix, we saw the repeated application of a solution of the corrosive sublimate in the nitro-muriatic acid eminently successful in changing the condition of the sore, and in causing it to assume a healthier state of action. For the treatment of those derangements in the functions of the pelvic and other viscera, that are liable to be excited by or to accompany chronic metritis, we refer to the articles in the present work particularly devoted to the consideration of the diseases of these viscera.

FIBROUS TUMOURS OF THE UTERUS.

Anatomical characters.—Nature.—Progress.—Symptoms.—Prognosis.—Treatment.

The uterus may be the seat of various heterologous deposits and morbid growths. Of these by far the most frequent in their occurrence are fleshy or fibrous tumours. This appellation is applied to a species of tumour, and which, as its name implies, is characterised by its highly marked fibrous texture. On dividing such tumours they are found to consist of a mass of irregularly convoluted and contorted fibres. These fibres are generally also collected into a number of separate nodules or lobules, which are connected together by loose cellular tissue; so that in each tumour we can generally trace an aggregate, as it were, of smaller tumours which may be either nearly equal to one another in point of size, or have one or more among the number disproportionally large.

Fibrous tumours are attached to the uterine structure in which they are imbedded by a capsule of cellular tissue, which is sometimes so lax as to allow them to be easily enucleated. They vary much in size. They may not be larger than a pea, and in some rare instances, on the other hand, they have been found to weigh as much as thirty or forty pounds. Generally we find several of them co-existing in different parts of the same uterus, and very unequal in regard to size. Their form is usually more or less globular, but they may be very irregular in shape, and either equal or nodulated on their surface. Though fibrous tumours are found in the body or fundus of the uterus in probably the majority of females advanced beyond the age of forty or fifty, yet they are rare in the region of the cervix. They may occupy different situations in relation to the component parts of the walls of the uterus. Thus they may be developed: 1. immediately under the peritoneal coat; 2. in the substance of the walls; or, 3. they may be situated between the proper tissue of the uterus and the mucous coat.

In the first and last situation, they generally become more or less pedunculated. When imbedded in the substance of the walls, they are usually more chronic in their growth and denser in their tissue, than when placed beneath either the peritoneal or mucous membranes. Indeed, the rapidity of their development and the degree of their density seem to be always regulated in a great measure by the amount of resistance which is offered to their increase by the neighbouring tissues. Hence it happens, that if they are placed near one of the surfaces of the uterus, they enlarge principally in the direction of that surface, or towards the side from which they meet with the least resistance; and they may thus come to carry before them in the direction of their greatest increase a thin layer of the proper uterine substance. Further we find, that in proportion as the resistance of the neighbouring parts is overcome either by the natural position or by the growth of the tumour, that its development is correspondingly rapid, and its component tissues become less and less compact, so much so that when the tumour is only restrained by the mucous lining of the uterus, it may partially assume a loose cellular, vesicular, or cystic structure (the *vesicular* or *cystic polypi* of some pathologists). In other cases where this diminution in their density does not take place, when the tumours are situated in the circumstances alluded to, it will be found that the resistance to their greater development has been sufficiently maintained through the restraint exercised by the strong capsular layers of the tumour itself.

Many pathologists look upon fibrous tumours of the uterus to be of a scirrhous or carcinomatous nature. We are ready to admit that, like all other tissues either healthy or morbid, they may become the seat of the deposit of carcinoma, when the diathesis of that disease happens to coexist, and that then the tumour of which we speak may present all the characters

and changes peculiar to a part attacked with that affection. We admit further, that the low vitality of fibrous tumours may predispose them to be the first, or one of the first, seats in which the carcinomatous deposition, when it does occur, may localise itself. But it is certainly no part of the pathological history of fibrous tumours that they are primarily of a scirrhous nature, and have a natural tendency to undergo the alterations characteristic of a scirrhous part. On the other hand, the series of changes which usually occur in them is of a very different kind. Like all morbid fibrous tissues, their principal tendency is to degenerate first into cartilaginous matter, and subsequently to become the seat of an osseous or calcareous transformation. This calcareous degeneration sometimes commences towards the circumference, and in other instances towards the centre of the tumour, and occasionally it goes on to a degree of stony induration. In fact, the bodies described by the older pathologists under the name of womb-stones are merely degenerated fibrous tumours that have produced ulceration through the intervening mucous and other tissues, and thus reached the proper cavity of the uterus, from which they are occasionally afterwards expelled by the uterine contractions. We have had repeated opportunities of remarking this calcareous degeneration equally in the very smallest fibrous tumour, and in those of a larger size.

We believe that fibrous uterine tumours may, in some rare cases, undergo another or cellular form of transformations, and in this way become diminished both in density and volume. It is only by this kind of cellular atrophy that we can explain to ourselves the circumstance of the disappearance to a greater or less degree of uterine tumours that appeared to have all the characters of the fibrous tumour. We have lately had an opportunity of watching one such case, and there are a few others on record. The appearances after death, observed in some instances of this kind, would prove a great addition to our present knowledge.

Fibrous tumours are not very vascular, but we have seen two or three specimens in which their bloodvessels were beautifully and minutely injected. They are very liable to attacks of inflammation, and are more particularly prone to this morbid action when pregnancy supervenes. Under the last condition they entail great danger upon the patient; for very frequently, owing to the increased supply of blood which is afforded to them by the enlarged vessels of the pregnant uterus towards the latter months, or in consequence of the injuries they sustain at the period of parturition, they take on a destructive degree of inflammatory action, which speedily ends in effusions of serum and unhealthy purulent matter into the tissues of the tumour. Softening and disorganisation of some parts of their internal structure are thus rapidly produced. We here speak principally of loose fibrous tumours connected with the pregnant uterus, for we have known more than one instance, where these tumours, when dense and of small size, showed no tendency to assume inflammatory action.

We may only add further, with regard to the pathological history of fibrous tumours, that they not unfrequently excite at different periods of their course, considerable irritation and inflammation in the surrounding tissues of the uterus.

Symptoms. Occasionally we meet with large fibrous tumours in the uterus of the dead body, that have not given rise to any appreciable symptoms duling life. When imbedded in the proper structure of the uterus, or situated below its peritoneal coat, they rarely produce any phenomena, except those attributable to their mechanical pressure and irritation upon the adjacent organs. In this way we may find them disturbing, to a greater or less extent, the function of the bladder or rectum, producing various complaints by their pressure upon the pelvic vessels and nerves, or leading to that feeling of bearing down, which all enlargements and irritations in the uterus are so apt to occasion.

In these instances, the functions of menstruation may be either irregular

or scarcely interfered with; but when the tumour is situated towards the mucous surface of the organ, we generally find the catamenia increased in quantity, and accompanied with coagula and discharges of blood. The great practical distinction between the effects of fibrous tumours, as imbedded in the substance of the organ or beneath the peritoneum, and as located behind the mucous membrane, consists in the marked tendency of the disease in the latter situation to produce considerable and even fatal attacks of hæmorrhage. A leucorrhœal discharge is also frequently present, when the tumour is thus so placed, as to keep up a degree of chronic irritation and inflammation in the mucous lining of the uterus.

Examination through the abdominal parietes, or by the vagina or rectum, may enable us to recognise the presence of the tumours, when they have attained a considerable size, and to determine their position, magnitude, &c. When the uterus is the seat of an aggregation of such tumours, it presents a dense resistance, and a nodulated and irregular form, that are quite peculiar to the disease.

Prognosis. In simple fibrous tumours, the prognosis may in general be very favourable. They rarely grow to such a size as to prove very hurtful to the patient from their mere magnitude, and, as we have seen, they are not intrinsically liable to take on any destructive morbid action. When imbedded in the uterine walls, or below the peritoneum, they may remain perfectly dormant, for a long series of years; but they are always liable, as we have already stated, to occasional attacks of inflammation, when sufficient exciting causes are applied. When they project into the uterine cavity, they require removal, in consequence of the discharge and hæmorrhage which they excite.

One of the greatest steps made in modern times, in the pathology of the uterus, is the perfect distinction of these fibrous tumours from cancer of the organ, and the consequent difference which we are now enabled to form in individual cases, with regard to their prognosis.

Treatment. From the pathological remarks that we have made, it will be readily inferred that the treatment of fibrous tumours is in general more of a negative and palliative, than of a positive character. It has been supposed that iodine, mercury, and other deobstruent medicines have had the effect both of arresting and reducing fibrous tumours. It would require, however, more evidence than we as yet possess, before we could with certainty assign such powerful effects to the remedies in question. In general, all that requires to be done is simply to use means to avoid as much as possible morbid determinations of blood to the vessels of the uterus, to subdue inflammation when it does supervene by the means already pointed out under metritis, and to restrain excessive hæmorrhage by the measures described in the article MENORRHAGIA. In the submucous variety of fibrous tumours, it sometimes occurs, that no means less than the use of the vaginal plug or tampon will be sufficient to arrest the dangerous hæmorrhage that occasionally accompanies this variety of the disease.

Fibrous tumours have occasionally been separated from their connections by ulceration of the intervening uterine tissues, and have in this way come to be discharged from the female passages. In other instances in which they were pediculated, the pedicle has become more and more slender, till at last the tumour was actually separated. We have known such a separation take place even in subperitoneal fibrous tumours; but we speak of it here, as it is more frequently seen, in the submucous variety. Both these operations of nature have been imitated successfully by the surgeon; and the latter in particular is constantly had recourse to when the disease assumes that form which we have next to consider, namely, POLYPUS OF THE UTERUS.

POLYPUS OF THE UTERUS.

General description.—Forms.—Symptoms, local and constitutional.—Diagnosis.—Prognosis.—Treatment.

The term polypus of the uterus is employed to designate a class of tumours that grow from the inner surface of this organ, or of its os and cervix, and are attached to these parts by means of a neck or pedicle, less in diameter than the body of the tumour itself.

Uterine polypi vary greatly in regard to shape, size, and other physical characters. Generally, they are of a pyriform figure, but we find them nearly or even round in some instances, and of a tapering elongated shape in others. They vary in size, from the volume of a pea to above that of a child's head. Their surface is generally smooth, but it may present considerable difference of colour, being sometimes pale and straw-coloured, and in other cases more or less bluish or purple, and vascular. These polypi may grow from the fundus of the uterus, from its body, from the inner surface of the cervix, or from one of the lips of the os uteri. They are generally attached by their single original pedicle, but we have seen a preparation of polypus that was provided with two, and of another attached by three points or pedicles to the inner surface of the uterus, probably in consequence of adhesive inflammation having taken place between their surface and that of the contiguous mucous membrane, in the locality of these second attachments. Their investing membrane is not unfrequently the seat of inflammation, and it is sometimes under the aggravation of symptoms arising from this cause, that the patient applies for medical aid. We lately were consulted in a case of an enormous polypus which distended the whole cavity of the vagina. On making an examination, the finger brought away a quantity of recent coagulable lymph that had been effused upon the surface of the polypus; and we once witnessed the dissection of a case in which the surface of the tumour was universally adherent, through the medium of a recent false membrane, to the internal surface of the dilated uterus.

A polypus of the fundus or body of the uterus is in its first cemmencement, and when still small, entirely enclosed within the cavity of the organ; but, in general, it gradually dilates the cervix and os uteri and passes through it, either slowly or insensibly, or it stimulates the containing organ to contract forcibly upon it, and protrudes it, more or less completely, into the vagina. But exceptions to this may be met with; for occasionally we find (as in the case above adverted to) a polypus of a large size still altogether included within the uterine cavity.

Uterine polypi differ considerably from one another in their pathological structure. The principal varieties that we meet with in practice may be reduced to the following forms:

1. Polypi composed of a structure the same as that of the fibrous tumour of the uterus, which we have already described. In fact this kind of polypus, which is the most common type of large uterine polypi, consists merely of a fibrous tumour that had been originally placed immediately beneath or near the mucous surface of the organ, but by afterwards enlarging in the direction of the uterine cavity, it ultimately forms a pediculated or true uterine polypus. This fibrous polypus may, like the fibrous tumour of the uterine walls, present a cartilaginous or osseous transformation of its tissue.

2. Polypi of a cellular tissue, resembling in structure and origin the common benign polypus of the Schneiderian membrane; and, like it, consisting of a morbid hypertrophy of the submucous and mucous membranes of the affected part.

3. A vesicular or cystic variety of uterine polypus is sometimes met with.

The cystic structure may be seen through the semitransparent coats of the tumour in some cases, while in others, it is not apparent until section is made; and it may be confined to the centre or some other individual part of the growth. We have seen this kind of polypus existing in the same uterus with other small polypi of a strictly fibrous tissue, aud we believe the former to be merely a type of structure assumed by the fibrous, and probably, also, by the cellular polypus, when their growth or increase towards the uterine cavity is less restrained than usual from the relaxed state of their investing mucous membrane, or in consequence of the morbid dilatation or dilatability of the uterine cavity itself.

4. A small variety of polypus is very frequently met with growing from the mucous surface of the cervix, and resembling in its structure in most points the second species. This common species of uterine polypus appears to begin originally in a morbid dilatation of one or more Nabothian glands. These glands are very often seen greatly distended, and give an appearance of numerous small serous cysts existing below the mucous membrane of the cervix.

5. Another variety of polypus, with a broad base and composed of erectile tissue, has been found in a few rare cases attached to the fundus of the uterus. The trunks of the vessels supplying these several varieties that we have described, are in general not very large; though ramifications upon the surface of it are usually morbidly dilated. Occasionally, however, the vascular trunks passing through the pedicle are large enough to cause considerable and even dangerous hæmorrhage by their division. In a case in which we removed a very small fibrous polypus by excision, hæmorrhage took place within a few hours after the operation, to such a degree as to cause repeated syncope.

Symptoms. The local symptoms accompanying polypus of the uterus consist of those to which a foreign body may readily be conceived as giving rise, when occupying the cavity of the uterus or vagina. Thus the mucous secretion of the female passages is increased, and usually becomes more or less purulent in consequence of the irritation and inflammatory state of the mucous membrane, which is kept up by the presence of the polypus. In other words, there is almost always a state of leucorrhœa present, commencing from an early stage of the disease, which varies much in quantity in different cases. The discharge itself is in general comparatively inodorous, but it occasionally has a fœtid character, in consequence of being retained for some time in the passages by the polypus offering a mechanical obstruction to its free escape. The mucous or muco-purulent discharge is in most instances followed, sooner or later, by an occasional intermixture of blood from the surface of the polypus.

This hæmorrhagic discharge is apt to occur under the action of any causes producing a temporary determination of blood to the parts, and if the patient still menstruates, it is generally first observed at the menstrual periods. When the hæmorrhage is at any time profuse, the blood may escape in a fluid state, but it is generally voided in the form of coagula: these coagula occasionally show a laminated appearance, as if they had been moulded upon the surface of the polypus.

These several symptoms of polypus are often mistaken for those of simple leucorrhœa or simple menorrhagia, and the fears of the patient and practitioner are not excited, in consequence of the discharges being unaccompanied by pain. In addition to these uterine symptoms, there may be present the usual phenomena produced by the irritation and mechanical obstruction of a foreign body, situated within the cavity of the pelvis. There is often, particularly after the polypus has acquired any considerable size, a feeling of weight, with dragging sensations in the loins and back. Bearing down pains sometimes occur, more especially when the tumour is making its way from the uterus into the vagina. Tenesmus and dysuria may result at a later stage from the obstruction and irritation produced by the tumour upon the urinary and intestinal passages. Severe constitutional symptoms are often induced by polypus in the uterus. If the leucorrhœal or hæmorrhagic discharges are profuse, the stomach generally

suffers much. Severe dyspepsia supervenes with vomiting, palpitation, excitement of the pulse, œdema of the limbs, and other symptoms of constitutional debility and cachexia, and if the disease be neglected the patient may sink under the continued discharges. The quantity of hæmorrhagic discharge and constutional debility, accompanying polypus of the uterus, is not, by any means, always proportioned to the size of the tumour; thus a small polypus at the cervix sometimes gives rise to effects as severe and fatal as those produced by one of the largest volume.

Diagnosis. The preceding local and constitutional symptoms are so common in most chronic organic diseases of the uterus, that our diagnosis of polypus can never approach to certainty, unless we make a vaginal examination. In every case of obstinate leucorrhœa or menorrhagia, it is the imperative duty of the practitioner to do so, in order that he may ascertain the pathological state of the uterus, which he has in reality to treat.

On making an examination per vaginam in a case of polypus, a tumour in some respects moveable, and with its stalk passing either entirely through the os uteri, or attached to one of its lips, is generally at once detected. The tumour may, however, on our first examination, be still entirely included within the cavity of the uterus, and hence may not be reached by the finger. The tumour itself is, in the great majority of instances, perfectly insensible, so that it may be pinched or punctured without producing pain; but rare exceptional instances to this general rule occasionally occur in the case of fibrous polypi, that had descended into the cavity of the vagina invested by a considerable layer of the proper tissue of the uterus.

Prognosis. When once polypus of the uterus is detected, the prognosis may in general be highly favourable. The difficulty of the case consists as much in making the diagnosis as in following out the treatment. The diseased structures of which common uterine polypi are composed have no tendency to reproduction after they are once removed. The operation for their removal is in the great majority of cases attended with little danger; and the rapid improvement which the patient experiences after its performance renders it one of the most satisfactory which the practitioner is called upon to perform. The polypus is certainly not in itself a tumour inevitably fatal, nor in any degree malignant in its character, but it is liable (as we have already observed), if it goes on progressing, to produce death by the excessive discharges and constitutional effects which we have described. In some instances the tissues of the tumour have become inflamed and broken up, and the inflammatory action has stretched to the uterus and peritoneum and thus proved fatal. In a few rare instances, the tumour has been successfully separated at its pedicle by the efforts of nature; and it is this operation which we endeavour to imitate with such advantage in its treatment.

Treatment. The usual treatment of menorrhagia and leucorrhœa may be temporarily useful in cases of polypus; but it is an established rule in practice, that as soon as the tumour is sufficiently within reach, it should be removed by operative interference. The tumour may be separated by one of three methods: 1. If it is very small, or of a cellular character, it may be reversed by torsion; 2. The tumour may be drawn downward and the pedicle divided by the knife or scissors; and 3. A ligature may be applied to the pedicle of the polypus, and thus a process of disjunctive ulceration may be set up in the constricted part to such an extent, as completely to divide the stalk in the course of a few days.

We must refer to works on midwifery and surgery for the details of these different operations and the particular cases to which they are each respectively applicable.

CAULIFLOWER EXCRESCENCE OF THE UTERUS.

Pathological nature.— Symptoms.—Treatment.

A morbid fungus-like excrescence sometimes grows from one lip, or from the whole circumference of the os uteri, insensible like the ordinary polypus, but differing from it in having a broad base and rather irregular surface, and with a greater disposition to bleed, and a much more marked tendency to become reproduced, after it has once been removed.

This species of growth has received the name of cauliflower excrescence, in consequence of its generally granulated surface: both in colour and other physical characters it might be more properly compared to the strawberry. The granular surface is not by any means always distinct during life, and the fungus mass often imparts the feeling to the finger of a solid and irregular coagulum of blood, or, as it has been described by some authors, it communicates to the touch a sensation like that of the uterine surface of the placenta.

Pathological nature. Considerable difference of opinion has been expressed by pathologists with respect to the morbid anatomy of cauliflower excrescence. Several facts would almost seem to show that, in its first stage, the disease partakes much of the nature of an erectile tumour, or of simple vascular sarcoma. Thus its occurrence in some cases as early as the twentieth year of life, its occasional shrinking and almost total disappearance upon the application of a ligature, or after the death of the patient, its alleged total removal in one or two instances under the use of astringent applications and other simple means, the slowness of its general progress during life, and the healthy condition of the neighbouring tissues and parts after death, are all circumstances which lead to the opinion that, in the earlier part of its progress, the tumour is at least not of a carcinomatous nature. At the same time, however, we have seen sufficient evidence to convince us, that the cauliflower excrescence may become the seat of carcinomatous or encephaloid deposit during its progress, whatever may be its nature at its first commencement. We have a preparation in our museum of a cauliflower excrescence which we removed a short time ago by excision of the cervix uteri. The growth has the small granulated character very well marked upon its surface: on rubbing a portion of the recent tumour between the finger and thumb, it readily broke down, and left a kind of vascular or cellular frame-work; but, after immersing for some time the mass of the tumour in an alcoholic solution of corrosive sublimate, it presented to the touch and sight an appearance exactly resembling that of cerebral matter hardened by the same means, with the exception only of showing a number of small cells on the surface of the section.

Symptoms. Cauliflower excrescence is accompanied with little or no pain. From the delicate vascular membrane which invests its surface an abundant secretion or exudation of serous fluid is generally poured forth; and this discharge constitutes, along with the great tendency to hæmorrhage, one of the most marked effects or symptoms of the disease. Hæmorrhagic discharges are liable to occur from its vessels, under any causes producing local excitement or determination of blood to the uterus. These occasional hæmorrhages and the drainage occasioned by the profuse watery secretion from the surface of the tumour, sooner or later produce general symptoms of anæmia and constitutional exhaustion. The watery exudation is inodorous in most cases: occasionally it is mixed up and accompanied with leucorrhœal discharges.

On making a vaginal examination during life, the physical characters of the tumour which we have above described are easily recognised, and its insertion into the os uteri by a broad base ascertained. When examined by the speculum, the surface of the tumour is seen to be very red or of a bright flesh colour. The tumour itself may not be larger than a hazel-nut, but in a few extreme cases, it has been of sufficient size to fill and distend the whole cavity

of the vagina, and even to protrude partially at the vulva. In many instances, the disease does not attract the particular attention of the practitioner until the tumour has reached the volume of a large strawberry.

Treatment. As palliative measures in this disease, our two great indications are, 1. to enforce all those measures general or medical, which are calculated to prevent or subdue determinations of blood to the vessels of the uterus, such as mild and unstimulating diet, the recumbent posture, avoiding mental and sexual excitement, with the application in some cases of cupping-glasses and derivatives to the lumbar or sacral regions: and, 2. to use means to arrest the abundant and exhausting watery discharge from the surface of the tumour and the hæmorrhages which are occasionally taking place from it, by the use of the cold hip bath or douche to the loins, and by the employment of astringent injections. These means appear to be often further useful in this complaint, by producing such a degree of contractile resistance in the walls of the vagina, as compresses the tumour, and so restrains the rapidity of its increase. It is always important to keep the bowels open, as the pelvic congestion arising from constipation is apt to increase both the watery discharge and hæmorrhage.

It has been proposed to destroy cauliflower excrescences by the use of caustic, and they have often been partially removed by the application of a ligature to their base. The good results following this treatment can scarcely be expected to be more than temporary; and occasionally the ligature has done much harm by the irritation which it has caused, and the impetus which has thus been given to the regeneration of the disease. For our own part, we believe that if we adopt at all any form of operation for cauliflower excrescences, the amputation of the cervii uteri, and the consequent excision of the very basis of the tumour, is the only measure which promises ultimate success. The disease has recurred in some instances even after this operation, but in other cases on record, the patient was known to remain free from its return for several years afterwards. In the case to which we have above referred, and in which we excised the cervix uteri, together with a cauliflower excrescence of the size of a small orange attached to its posterior lip, the patient had not one bad symptom, local or constitutional, after the operation, and is now beginning to lose her anæmic appearance and regain her former looks and strength. The form of diseased structure of the tumour in this case is certainly such, as renders its future reproduction very probable: but at the same time there is no doubt that the operation has, in the mean time, entirely freed the patient from those discharges, which were making very rapid inroads upon her constitution, aud that it will at least prolong her life, if it do not entirely preserve her from any future return of the disease.

CARCINOMA OF THE UTERUS.

Description. — Symptoms, local and constitutional.— Treatment.

No organ in the female body is more liable to carcinoma than the uterus. This disease attacks the uterus under all its different modifications, from simple scirrhus to extensive cancerous ulcerations and encephaloid deposits in the walls of the organ and in the contiguous structures of the pelvic viscera. The carcinoma generally affects the structures of the cervix in the first instance, and thence spreads upwards into the walls of the uterus and downwards into the upper part of the vagina. We have, on the other hand, seen specimens of it in which the disease followed a different course, attacking the fundus first, and thence spreading downwards in the direction of the cervix. When it commences, as it certainly does in most cases, in the tissues of the cervix, it may appear under the form of a limited deposit or tumour. Most frequently, however, it infiltrates and indurates the whole substance of the cervix, and

spreads early, in a greater or less degree, both upwards along the walls of the uterus, and downwards into those of the upper part of the vagina, without there being any very marked limit, at which it would be possible to point out an exact line of demarcation between the healthy aud diseased structures. The carcinomatous degeneration after a time affects the more contiguous tissues of the pelvis. The intervening cellular tissues, and latterly the walls of the bladder and rectum, become thickened and changed into the diseased structure. The process of disorganisation and ulceration commences at different periods in different cases. Sometimes the deposit has taken place to a great extent in both the cervix and neighbouring parts before ulceration supervenes. In other cases, this process begins at a time when the tissues of the cervix itself are only partially indurated and affected. If the patient survive, the ulceration extends latterly into the rectum, and still more frequently into the cavity of the bladder; or the cavity of the peritoneum may be perforated by the ulceration and sloughing of the affected tissues. At the same time that the process of ulceration is proceeding in one part, the deposit of encephaloid matter may be going on in another; and ultimately, at the period of the patient's death, the contiguous structures of the uterus and upper part of the vagina, the posterior wall of the bladder and urethra, and the anterior wall of the rectum, with their connecting cellular tissues, are ultimately amalgamated, and form one nearly homogeneous mass of carcinomatous degeneration and frightful ulceration. The neighbouring lymphatic glands are often diseased, though not to a very great extent; and frequently the branches of the veins of the uterus and of the adjoining affected parts are filled with the carcinomatous deposit.

Symptoms. The effects produced upon the functions of the uterus itself and the surrounding pelvic organs, by carcinoma in its first stages, differ in few or no respects from those attending other organic uterine diseases. The sensation of pain in the affected part is in general more acute, hot, and lancinating, than in the other forms of disease to which we allude, but it varies exceedingly in different cases in its character and intensity, and even in its locality. In some instances, it as well as the other usual symptoms of pelvic irritation and uneasiness are so very slight, as not to excite the attention or fears of the patient, until the ulcerative stage of the disease is considerably advanced. This certainly is not a very common exception to the general rule, but it is useful in showing us the fallacy of placing implicit confidence upon any particular symptom or set of external symptoms in this and other organic diseases of the uterus.

The menstruation is generally irregular and profuse, but in the first stage of the disease, it may remain unaffected; and at that period conception may even take place, and the woman proceed to the full term of pregnancy. We have seen two cases of this kind, both of whom sunk under all the more aggravated symptoms of carcinoma in the course of a few months after delivery. In one of these cases, the structure of the cervix was so indurated and enlarged at the time of parturition, as to have conveyed to the attendant the impression that the head of a second child was presenting.

On examining per vaginam in the first stage of carcinoma, the cervix uteri (if it form the seat of a deposit) is found tumefied and indurated. The induration is sometimes diffused; more generally, perhaps, it is circumscribed or notched and irregular. The os uteri is more patulous than usual, and the pressure of the finger upon the rigid lips produces pain and some sanguineous exudation. The uterus is usually partially prolapsed and less movable in the pelvis. The speculum shows the surface of the cervix tense and shining, and of a reddish, purple, or brownish hue. It is certainly difficult, however, either by sight or touch to distinguish between the state of the cervix peculiar to chronic metritis, and that present in the first stage of carcinoma. When the parts begin to ulcerate, the disease is more easily distinguished by a vaginal examination. The irregular fungous ulcer is visible by means of the speculum, and its surface is generally tender on pressure. The other external symptoms

also become more unequivocal. The leucorrhœal discharge which has generally been present from an early date, now assumes more and more of a fœtid and sanious character, in consequence of being mixed with the discharges from the ulcerating and disorganising surface of the ulcer. It has a peculiar and highly offensive odour, is more or less discoloured, and often by its acridity causes pruritus and irritation of the passages and vulva. The discharge very soon becomes mixed with blood; and occasionally a profuse hæmorrhage is almost the first symptom which alarms the patient. In advanced life this hæmorrhage is often mistaken for a reappearance of the catamenia.

As the disease advances in its destructive progress, the constitution deeply sympathises, and all the symptoms of cancerous hectic that supervene, are fearfully increased and aggravated by the excessive discharges and other distressing local symptoms; the sympathetic morbid states excited in distant organs occasionally bring on symptoms very nearly resembling those of heart disease, and of dyspepsia and nephritis. There is often dysuria with tenesmus; while the functions of the bladder and rectum are otherwise greatly disturbed. If perforation of their coats take place, the urine and fæces may be latterly discharged by the common cloaca of the vagina, and at last the patient perishes in misery and anguish beneath her accumulated load of local and constitutional sufferings.

Treatment. In cancer of the uterus, as in cancer of other organs, medicine offers no hope of effecting a cure; and in the few observations which it is necessary to make in this place upon the treatment of the disease, we shall merely very briefly allude to the general means which appear to have the most influence either in retarding the progress, or in alleviating the symptoms of this hopeless and frightful malady.

In the early stage of the disease, the great indication is to prevent or subdue anything approaching to vascular activity in the affected part. The more completely we can attain this end, the longer, in all probability, we shall be able to keep the disease in a latent state, and we certainly can often date the occurrence of the ulcerative or second stage to the action of some aggravating causes of local excitement.

To fulfil this indication, it will be necessary to feed the patient upon a mild and unstimulating diet, to promote the action of the skin and intestines, to avoid all causes of general or local vascular excitement, whether corporeal or mental, to avert the effects, as far as possible, of the catamenial congestion by the means pointed out under that head, and to subdue any other congestive or inflammatory determination of blood to the uterus, by the application of cupping-glasses to the loins or sacrum, or by leeches to the vulva or region of the anus. When there is any tendency to hæmorrhoids, (as sometimes occurs, when local uterine congestions take place in connection with this or other organic diseases of the uterus) the application of a few leeches so as to drain blood from the hæmorrhoidal vessels, is a practice often attended with direct and excellent benefit. After these remarks it is unnecessary for us to state our opinion of the injurious effect of those stimulant and astringent injections which are too often prescribed in the first stage of this disease, in order to control the leucorrhœal discharge and the symptoms of menorrhagia that sometimes attend upon it.

In the second stage of the disease, in addition to attending as much as possible to the general health, and to the relief of the different complications that may arise, medicine can do little or nothing except subdue the attendant bodily and mental suffering by powerful sedatives. These sometimes are called for even in the first stage, when the pain is more than usually severe. The sedatives must be varied from time to time, in order to keep up their action on the system. Opiates may be used in the form of sedative washes, or they may be employed as internal medicines, and alternated or combined with hyosciamus, belladonna, conium, and the like. The preparation of this last medicine (hemlock) often seems to act with almost a specific sedative power over painful

affections of the uterus. The fœtor of the discharge may in some degree be corrected and modified by the assiduous use of weak injections of chloride of lime; and the passage of the external organs may be defended against its acrid effects by frequent ablution, and the inunction of their surfaces with oleaginous substances.

A surgical cure of cancer of the uterus has been attempted in a number of cases, by removing the whole organ. The almost immediately fatal results of this operation in by far the greatest proportion of instances, and the unsatisfactory termination of it in the remaining cases in which it has been performed, are such as will, in all probability, prevent others from recklessly repeating it.

The less formidable operation of excision of the cervix uteri has evidently been had recourse to on the continent of Europe in so many cases in which true carcinomatous disease was not present, and the effects of it in true cancer have hitherto been so imperfectly followed out and detailed, that we have not as yet any sufficient data upon which to form a true estimate of its value from experience alone. From what we have observed, however, in regard to the pathology of cancer of the neck of the uterus, and from its generally involving at an early date the more immediately contiguous structure, we are inclined to believe that if found at all useful, it will only be in a very limited number of cases.

CORRODING ULCER OF THE UTERUS.

Characters of this ulcer.—Diagnosis.—Treatment.

A PECULIAR and dangerous variety of disease, known among English authors under the name of malignant or corroding ulcer, sometimes attacks the uterus It commences in the cervix of the organ, and when the attention of the practitioner is first attracted to it, by the occurrence of hæmorrhages or other symptoms, the ulceration may not have extended beyond the mucous membrane, but it gradually spreads in an irregular manner over the whole surface of the cervix, and in its further course involves the walls of the uterus and vagina, and may ultimately perforate the parietes of the rectum behind, or of the bladder in front. Sometimes it has been known to reach the cavity of the peritoneum and give rise to fatal peritonitis.

Of late years pathologists have described corroding ulcers as a result of inflammation in the affected parts. We believe that this explanation may be so far true, but at the same time we cannot but regard the inflammatory action as at least specific in its nature. Its whole pathological history and characters appear to us to assimilate it with that destructive chronic inflammation and ulceration which constitutes lupus in external parts. If the phenomena of the first commencement of the corroding ulcer were more accurately ascertained, this analogy would probably be found to be more correct than the present state of our knowledge will warrant us to assume.

Corroding ulcer of the uterus has often been mistaken for the true cancerous ulcer. The two diseases are doubtless very similar in their symptoms, course, and terminations, but the corroding ulcer specifically differs, in two important respects at least, in its pathological history from carcinomatous ulceration: 1. The corroding ulcer is not preceded by carcinomatous or other morbid deposit in the affected part, similar to that which takes place previously to the commencement of ulceration of a truly cancerous nature. In several preparations of sections of uteri affected with corroding ulcers which we have had an opportunity of examining, we have observed with surprise the uterine and other involved structures apparently perfectly healthy up to the very line of the existing ulceration; and in corroding ulcers, the whole uterus may be seen

sometimes eaten away to near the fundus, without the remaining part being materially altered in structure.

2. Corroding ulcer, like the ulcer of cancer, generally goes on though at a slower pace to a fatal termination, but certainly in some cases the disease has appeared to be ultimately cured by the efforts of nature, or by the use of local applications; and this is a termination which we assuredly never see in true cancer.

Diagnosis. The general and local symptoms of corroding ulcer are those characteristic of cancer. The attendant pain is usually not very acute. The diagnosis between it and cancerous ulcer can be only accurately made by vaginal examination, and by watching the effects of treatment. The great point of distinction consists in the fact, that before carcinoma has gone on to ulceration, it has in general been already preceded by such a quantity of morbid deposit in the cervix uteri and neighbouring tissues, that on examination by the vagina and rectum, the uterus itself is found to be much more fixed and immoveable than it is in the healthy state, and the cavity of the pelvis is more filled up. On the other hand, in cases of corroding ulcer we find, by the same examination, that so far from being more fixed, the uterus is equally if not more moveable in the pelvis than in the natural state, while the space around the cervix is not occupied by any deposition of new or foreign matter.

Treatment. The general indications of treatment in this disease are in their principles and details the same as those laid down in regard to carcinoma of the uterus. In corroding ulcer, however, we have one great additional rational indication in the employment of local applications calculated to arrest the ulcerative process, and excite a healthy action in the surface of the sore. Various means have been proposed and employed to attain this end. The applications of the solid nitrate of silver, muriate of antimony, solutions of corrosive sublimate in nitro-muriatic acid, and several other analogous stimulant and caustic substances have each been recommended by different authors. In the treatment of lupus we know well how seldom one kind of application agrees for any great length of time with the disease, and the same seems to hold good with regard to corroding ulcers. The application must, we believe, be repeatedly alternated, and probably practitioners have hitherto erred in the treatment of this affection in two different ways, viz. by applying medicine too powerfully caustic, when they have used local application, and by not persevering with sufficient assiduity in the employment of such mild local measures as we find useful in treating similar ulcers on other parts of the body. In the local treatment of a case of this kind, the speculum is an invaluable instrument in enabling us to make the applications that may be deemed necessary more directly to the affected part, and to it alone.

OTHER MORBID DEGENERATIONS OF THE STRUCTURE OF THE UTERUS.

Cartilaginous and osseous transformation. — Phlebolites. — Hypertrophy and atrophy. — Substances in the uterine cavity.

THE uterus is also liable to a number of morbid states and degenerations of minor importance.

Cartilaginous and osseous transformation. The walls of the uterus are occasionally the seat of cartilaginous and osseous transformation, independently of the presence of fibrous tumours. Either of these morbid conditions may occur throughout a large portion of the parietes of the organ, or they may be found only in particular parts of it. We have observed them most frequently in the higher part of the cervix, where they sometimes produce complete, or

nearly complete, obliteration of the os internum. Cartilaginous and osseous degenerations are rarely found in the substance of the uterus itself, except at very advanced periods of life; but we have seen an approach to both of these states, and, in the coats of the uterine vessels, at a comparatively early age.

Phlebolites are more frequently found in the uterine and adjoining veins than in those of any other part of the body; and we have found them there, in all stages of their progress, from simple fibrinous coagula to small solid calcareous masses. We believe these phlebolites to be a much more common morbid appearance in the uterine veins than they are generally reported to be.

Hypertrophy and Atrophy of the uterus are states which are occasionally met with, independently of any connection with other coexisting forms of organic disease. A diminution of the uterus, in regard to volume, may be very generally observed in females, who die at an advanced period of life; but this state can scarcely be said to be one of morbid atrophy.

Hypertrophy of the walls of the uterus, around the site of fibrous tumours, is a very common appearance. We have seen the uterine parietes in the neighbourhood of such tumours nearly as thick as the contracted uterus immediately after delivery, and with its bloodvessels enlarged in a proportionate degree. But again, in other instances of the very same form of tumour, when little irritation had been excited by the presence of the morbid growth, and when the tumours were in near apposition, we have found the portion of the uterine parietes enclosing it evidently diminished in thickness, and in a state of partial but decided atrophy. In some cases, we meet with a local atrophy confined to one or both lips of the os uteri; and in other cases, the same parts are found in a state of local hypertrophy, and projecting downwards into the cavity of the vagina.

The cavity of the unimpregnated uterus is liable to be changed, both in its figure and volume, in some states of organic disease of the viscus. Indeed, it is occasionally found to be partially or entirely obliterated, in cases in which organic and inflammatory disease has taken place in its walls, after the catamenial period of life has passed over. Both the shape and size of the uterine cavity are often found changed, when fibrous tumours are developed in considerable numbers in different parts of its walls. Under these circumstances the parietes of the organ often become enlarged and elongated, in proportion as the tumours themselves are developed, particularly when the tumours are situated towards the mucous surface.

The cavity of the uterus is at the same time lengthened, occasionally to the extent of several inches; and it may also be found irregularly contracted and dilated at different points.

The cavity of the unimpregnated uterus may be enlarged by the morbid accumulation of different fluid substances within it. Thus, when the catamenial fluid is not allowed to escape, in consequence of obliteration congenital or acquired of the os uteri, vagina, or external parts, the uterine cavity itself may become gradually distended to an enormous degree by the retention of the fluid within it. The same state, as we have already mentioned, occasionally, though rarely, takes place in instances of metritis, in consequence of large accumulations of pus within the uterine cavity. In this last case, the canal of the os uteri must necessarily be obliterated before the collection occurs. The mucous surface of the uterus and Fallopian tubes is in rare cases coated with a collection of true tubercular matter. This only happens in instances in which the tuberculous diathesis is otherwise well marked.

Substances in the uterine cavity. When the os uteri is accidentally shut up, especially at an advanced period of life, by the formation of tumours in that part of the organ or by chronic inflammation or other such causes, the cavity of the uterus sometimes becomes filled and distended by an accumulation of the mucous or sero-mucous secretion of its lining membrane. This constitutes the disease known under the name of *Hydrometra*, or *Dropsy of the Uterus.*

The fluid may vary in its qualities by admixture with blood, pus, &c. The quantity which may be accumulated within the cavity of the uterus in this disease is sometimes very great. The organ may be distended to a size equal to that which presents at the fifth or sixth month of pregnancy, and it has even been alleged, to an extent greater than the gravid uterus at the full time. Usually, however, long before any such extreme degree of distension takes place, the walls of the uterus, which in general become more and more attenuated as the accumulation increases, give way at some part or other from progressive absorption; or this result may be hastened by the supervention of ulcerative or gangrenous inflammation in a portion of the distended uterine parietes.

In hydrometra, as also in the other forms of morbid distension of the cavity of the uterus by fluid accumulations within it, the enlarging organ maintains pretty nearly the form and shape of the gravid uterus at different periods. In such cases, we may meet with a layer of coagulable lymph or false membrane, continuous or interrupted, lining the surface of the dilated cavity. This false membrane, which is merely the result of inflammatory effusion from the internal surface of the cavity, has, in some instances, been mistaken for decidua; and in hydrometra, it has often been erroneously looked upon as the walls of a hydatid.

The cavity of the uterus may also contain solid bodies; such as the separated polypi and womb stones (the nature and origin of which we have already described), accumulated coagula of blood, or of effused lymph, and ova that have become diseased and arrested in their development. Acephalocysts have been found imbedded in the walls of the uterus, and may probably have passed in some cases from thence into the cavity of the organ. But the morbid structure, known under the name of *Hydatids of the Uterus*, is of a very different nature, and consists merely of a diseased state of the membranes of the ovum, originating in a morbid persistance and development of the villi of the early chorion.

It is unnecessary to dwell, in this work, upon the treatment required for the expulsion and extraction of foreign solid bodies from the uterus; and in regard to hydrometra and other liquid collections within the cavity of the organ, we shall merely observe, that occasionally they each require to be evacuated by an artificial opening into the uterus, in order to avert the danger that would otherwise arise from their accumulating to such an extent, as to escape through the perforated or ruptured walls of the viscus into the cavity of the peritoneum.

INFLAMMATION OF THE OVARY, OR OVARITIS.

General observations.—Congestion and hæmorrhage.—Anatomical characters and termination of inflammation of the ovary.—Symptoms and diagnosis.—Causes and treatment.

The morbid states to which the ovaries are subject are very diversified in regard to their pathological nature, but in a practical point of view by far the most important are, 1. inflammation of the organ; and, 2. that complicated form of disease which is generally described under the common term of Ovarian Dropsy. We purpose in the first place to consider these two affections of the ovary in full detail, and afterwards to give a brief enumeration of the other organic diseases of a less frequent and less practical nature that invade this organ.

The general remark as to the rarity of disease in the internal sexual organs of the female during the earlier years of life, holds particularly true with regard to the ovaries. Morbid lesions are very seldom indeed found in them previous to the age of puberty. From the time, however, that the menstrual function is established, they are subjected to periodic congestions, to sudden changes in the state of the Graafian vesicles, to lacerations in their tissues, in consequence of the rupture of these vesicles, and to other morbific causes connected with derangements of the functions and consequences of menstruation, conception, and parturition, that, singly and conjointly, render the organs in question very common localities for diseased action in the female economy.

Congestion and hæmorrhage. The ovaries are the seat of a marked functional congestion at each menstrual period, for some time after conception, and probably also under the excitement of sexual passion. This congestion frequently terminates in small effusions of blood into the structure of the organ, and still more frequently into the Graafian vesicles. Many of the slighter morbid appearances which we so constantly meet with in the ovaries of the adult female, may be traced to these apoplectic effusions. A great portion of the lesions, known under the name of *false corpora lutea*, are no doubt attributable to this source; and we have often had occasion to trace the small effused masses of blood through all their series of changes, from a recent red coagulum, till they assumed a brown, yellowish, and ultimately a straw-coloured and fibrinous appearance, or were at least more or less completely absorbed. The degree of serous effusion accompanying these apoplectic clots modifies their appearance considerably. We have seen a true *corpus luteum* very exactly imitated in two or three instances in which the blood was still party-coloured, and coated the internal surface of a morbid Graafian vesicle that happened to have its walls thickened, and at the same time partially contracted and puckered in consequence of absorption of some of the effusion.

Inflammation. Inflammation of the ovary occurs both under the acute and chronic form. The acute variety is generally found in connection with co-existing inflammatory action in the uterus, broad ligaments or peritoneum; more frequently chronic ovaritis is found in an isolated and idiopathic form.

In the first stages of *acute* ovaritis, we find on dissection the organ reddened, injected, swollen, and generally softer than usual: serous effusion takes place early into the structure of the organ, and when mixed with purulent infiltration as sometimes occurs, the mass of the ovary will be found in a friable and almost disorganised state. Coagulable lymph, also, is in general early effused upon the serous surface of the organ in acute ovaritis, and in the more chronic forms of

this disease, this effusion often leads to the formation of extensive adhesions to the neighbouring peritoneal surfaces, or to the thickening and induration of the capsule of the ovary itself, or of the lining membrane of one or more of the Graafian vesicles.

When purulent effusion takes place, the pus, instead of being infiltrated into the tissue of the organ, is, particularly in some of the more chronic forms of the disease, collected into abscesses. These abscesses are generally small, and occasionally they are found to the number of three or four in the same organ. In other cases, however, one large abscess alone is formed, and distends the fibrous capsule of the organ to an excessive degree. The pus may again become absorbed, but much more frequently it leads to the ulceration and perforation or rupture of the containing cyst, and, according to the locality of the perforation, and the occurrence or non-occurrence of previous adhesions, it may be discharged into the cavities of the intestinal canal, urinary bladder, Fallopian tube, uterus or vagina; or it may escape into the cellular tissue of the pelvic and iliac regions, and produce all the phenomena of an ileo-coecal abscess, as it may be evacuated into the cavity of the peritoneum itself. This last circumstance has repeatedly occurred in cases of acute gangrenous abscess of the ovary during the puerperal month, but it is rare under other forms of large abscesses in this region. We have, however, known it repeatedly to take place where the disease was chronic, and the purulent collection very small. The erisypelatous form (as it has been called) of peritonitis, has, within our own knowledge, been traced in repeated instances to the irritation produced by the bursting of such small ovarian abscesses.

Symptoms and diagnosis. The presence of acute ovaritis is principally marked by a feeling of heat and deep-seated pain in the corresponding parts of the pelvic cavity. This local pain is generally increased, if the patient suddenly assume the erect posture, and when the rectum is distended in the act of defæcation. It sometimes stretches down the corresponding limb or affects the loins; and it is always liable to become much more acute in its character provided the inflammatory action spreads to the peritoneum. The function of the bladder is very frequently deranged, and the dysuria may be considerable: more rarely we have tenesmus, combined with a sensation of bearing down in the pelvic region when the inflammation spreads over the recto-vaginal reflection of the peritoneum.

After a time, when we press upon the lower part of the abdomen, we may detect a painful roundish tumefaction produced by the inflamed and swollen ovary; but this can only occur when the organ is considerably enlarged. In the earlier stages of the disease the transverse diaphragm, formed across the pelvis, by the septum of the broad ligaments and uterus, prevents us from being able to produce sufficient pressure on the ovaries behind it, to enable us to ascertain the existence of inflammatory tenderness in them, and, under these circumstances, it has of late been proposed by different authors to increase the certainty of our diagnosis by an examination per rectum. We believe that in this way we may ascertain the existence of morbid tenderness in the vagino-rectal reflection of the peritoneum, which may be done also by a vaginal examination, and further that we may touch the ovary when it is much enlarged or distended with purulent matter; but we entirely doubt the possibility, as a general rule, of the finger easily reaching the natural situation of the ovary, and ascertaining its degree of tenderness and swelling. We have, in several examples, endeavoured to ascertain the truth and applicability of this diagnostic mark upon the dead subject, and find it altogether impossible to touch the ovary in situ, even with a very long finger, except where the pelvis is unusually shallow.

Ovaritis does not in general give rise to many constitutional symptoms, except when it is very acute, or spreads to the peritoneum. We have then the heat of skin, quickness of pulse, and the other usual phenomena of inflammatory fever; these are apt to assume a remittent type, with alternations of

heat and cold, when the inflammation terminates in a collection of purulent matter.

When ovaritis is connected with acute inflammation of the uterus or peritoneum, its more particular symptoms are generally merged in, and masked by, those of the other disease.

In *chronic* ovaritis, the local symptoms, though less in degree, are the same in character, with those accompanying the acute form. There is sometimes, however, considerable irritation of the rectum, and disturbance in the function of the uterus. The disease, in this form, is always obscure, except when it is the result of the acute variety terminating in abscess, when the previous history of the case, the physical signs afforded by the volume and fluctuation of the resulting tumour, and the use of the hollow exploring needle, may enable us to arrive at comparative certainty in the diagnosis.

When both ovaries are affected with chronic ovaritis, the menstrual discharge may be suspended; sterility frequently results, both from the thickened state of the capsule of the organs, and from the mode in which their surfaces, as well as the extremities of the Fallopian tubes, are fixed and bound down by adhesions and false membranes.

Causes. The most common causes of ovaritis are the sudden suppression of the catamenia, or, any established discharge from the internal organs, exposure to cold, particularly during the menstrual period, physical injuries, and especially those which are apt to supervene in connection with parturition. The disease has often been observed as one of the many morbid appearances in puerperal fever, and occasionally occurs also in the puerperal state, as an idiopathic affection. Some authors have alleged that it is liable to take place in the female when affected with gonorrhœa, and under the same circumstances as hernia humeralis in the male. We have watched diligently for its occurrence in some hundreds of cases of gonorrhœa, that have been under our care in the Lock Hospital of Edinburgh, but have met with only one, and that a doubtful instance of it.

Treatment. When acute ovaritis is combined with common or puerperal inflammation of the uterus or peritoneum, it will be best treated by the remedies adapted to these particular diseases. When it occurs as a primary or idiopathic affection, it is necessary to direct against it, with greater or less activity, according to the intensity of the inflammation itself and the stage of disease, all the usual resources of the antiphlogistic treatment, such as general and local bloodletting, counter-irritation, diaphoretics, sedatives, &c. The local bleeding may be effected by applying leeches to the groin, vulva, or anus. Hot fomentations to these parts often give great relief; and we have found them most easily applied in the form of repeated warm poultices, medicated or simple, to the hypogastric region. Some practitioners place great reliance on the employment of calomel in different combinations. The bowels must be kept in a very soluble state, but all purgative medicines which in their operation irritate the rectum, must be avoided. The warm water enema under such circumstances is often of much use. The tenesmus, dysuria, and other symptoms of pelvic irritation, may require the use of strong opiate suppositaries and enemata, or the internal administration of combinations of hyoscyamus and camphor, and other remedies of a similar nature.

The chronic form of the disease requires little modification in the above treatment, except such as may be dependent on the diminished activity of the morbid action. Local bleedings and stronger external counter-irritation will here be requisite. Preparations of iodine and mercury may also be used.

When an abscess forms in consequence of ovaritis, acute or chronic, and is increasing rapidly into a considerable swelling, it becomes a consideration of serious moment to open it with the trocar, or, as has been recommended, with caustic, in order to prevent the bad effects which would necessarily result from its bursting into the peritoneum or cellular tissue of the pelvis. The place of opening will necessarily be regulated by the position and size of

the collection; and in such cases it might be well, as we have already suggested, to make ourselves certain of the contents of the swelling, by the aid of the hollow exploring needle, before venturing to open into it in a more free manner.

DROPSY OF THE OVARY.

Simple serous cysts. — *Dropsy and dilatation of a Fallopian tube.* — *Unilocular simple cyst, or dropsy of the ovary.* — *Ovarian cyst containing hydatids.* — *Compound or multilocular cystic dropsy of the ovary.* — *Symptoms and Diagnosis.* — *Prognosis.* — *Treatment.*

UNDER this, as a generic term, several different diseased structures have been indiscriminately classified by practical writers. These structures vary considerably in their pathological nature and history, and have this character only in common, that they all consist of a morbid structure situated in the region of the ovaries and broad ligaments, and contain a greater or less proportion of encysted fluid contents. The principal varieties of disease that may, with a practical view, be classified under this head, may, we believe, be reduced to the following modifications:

1. *Simple serous cysts, clustered together and attached originally to the peritoneal surface of the broad ligaments, Fallopian tubes, or ovaries.* These cysts which are very frequently found attached to the parts that we have mentioned both in the human subject and in the lower animals, are generally small and pediculated, but sometimes one of these cysts, or several of them conjoined, acquire a very large size, and under this circumstance have been frequently mistaken for, and described as instances of true cystic degeneration of the ovary. We are acquainted with the history of more than one case in which very large tumours of a pelvic origin were mistaken, even after the abdomen was laid open in the examination after death, for ovarian growth, until a more minute inspection showed that the ovaries were not implicated, and that the diseased structure had its origin in the broad ligaments. We have dissected one case in which an enormous number of small cysts were scatterred over the whole peritoneal surface of the internal sexual organs, and at the same time that the contiguous parts of that membrane were so intimately united to one another by morbid adhesions, that it required considerable care to separate them, and thus ascertain the true seat of the morbid cystic structure.

2. *Dropsy and dilatation of a Fallopian tube.* The distension of one of the Fallopian tubes, by an accumulation of fluid within its cavity, takes place in some instances to such an extent, and with such an alteration in the appearance in the parts, as to lead both the practitioner and the pathologist to confound it with true ovarian dropsy. If the dilated tube happen to be derived, as it sometimes is, by dissepiments, this mistake will only be the more readily incurred. The morbid changes of structure and situation, which frequently accompany this disease, render the discovery of its true nature occasionally a matter of considerable difficulty even in the dead body, and the volume of the resulting tumour is sometimes so great as to equal that of a very large ovarian dropsy. Several pounds of fluid have been repeatedly found in encysted dropsies of the tubes, and instances are on record, in which the accumulation has even amounted to upwards of twenty and thirty pints.

3. *Unilocular simple cyst, or dropsy of the ovary.* Instances of cysts of the size of a cherry or hazelnut, and consisting of a diseased and distended condition of one or more Graafian vesicles, are very often met with in the dead body, without having given rise to any marked symptoms of disease during life. We have often found the walls of these small cells of considerable

thickness, of a strongly fibrous or almost cartilaginous structure. But in the locality of the ovary, one single and very large cyst appears to be occasionally developed at the expense of the remaining part of the organ. Very large unilocular ovarian cysts of this kind are certainly by no means common, and rarely reach such a magnitude as the other forms of ovarian dropsy. We deem it unnecessary to inquire further into the primary pathological seat of such large unilocular cysts. They may, as we have just said, consist in some instances in an extreme degree of dilatation of one or more united Graafian vesicles, and we believe this to be their most frequent origin; but in other cases, they may possibly depend on morbid changes in the common cellular tissue of the organ itself.

4. *Ovarian cysts containing hydatids.* It has been avowed by some authors that large serous cysts may occur in the ovary, and contain within them a quantity of acephalocyst hydatids: in other words, it has been maintained that one form of ovarian dropsy was to be referred to a collection of true hydatids in the organ. We have not seen any such specimen in the various pathological collections which we have had an opportunity of examining, and we believe that few if any sufficiently authenticated instances of such a morbid lesion are to be found upon record. Ruysch has delineated one case, but the fact of his bestowing vessels upon the parietes of the hydatid vessels renders even that instance more than doubtful.

5. *Compound or multilocular cystic dropsy of the ovary.* This is certainly the most important type of ovarian disease which has been described under the name of ovarian dropsy, and constitutes by far the most frequent morbid structure which we find in large tumours in this region of the body. Indeed, ovarian tumours of this kind very generally reach a large size before death; but they may be found varying in absolute volume from a mass not much larger than the healthy ovary, to growths of such magnitude as to fill and distend the cavity of the abdomen, to an extent as great or even greater than the pregnant uterus at the full time of gestation. The individual cells or cysts belonging to these tumours differ exceedingly in number and size, and in the nature of their contents and parietes: they are also liable to considerable variety. In all compound cystic ovarian tumours that have reached even a moderate size, the number of individual cells or cysts is very considerable, and sufficient at once to set aside the idea, that they can depend on a morbid distension of the natural vesicles of the ovary. In many cases indeed of this form of morbid structure, the number of cells may be described as almost interminable, for the larger of these cells have several successive clusters of smaller cells developed and developing upon their internal membrane, in a mode somewhat analogous to the geminiparous forms of generation among the lower animals. The general size of the individual cysts is sometimes pretty equal throughout the whole tumour; but very generally we find one set of cysts, or one single cyst, so disproportionately enlarged as to constitute almost the entire bulk of the tumour. In this latter case, the tumour may have many of the physical qualities of a unilocular cyst.

Multilocular ovarian tumours present great and striking differences in the nature of their contents. Their cysts have been found to contain all possible modifications of morbid animal substance, from simple serous effusion to different kinds of gelatinous, meliceritous, atheromatous, encephaloid, melanotic, and even calcareous matter. Occasionally, more or fewer of these different substances have been found in different cells in the same tumour. Most commonly, their contents consist of a glairy fluid serum, or of a gelatinous semi-fluid matter of a yellowish or straw-coloured tint. In some instances, this matter is discoloured by effused blood, or pus, and in others contains a quantity of cholesterine. The parietes of the cysts, or in other words the solid portions of the structure of this class of ovarian tumours, vary very much in different instances. We have occasionally seen the solid part of the tumour much larger in proportion than the fluid. In some cases the dissepiments between the indi-

vidual cells are several lines or even more than an inch in thickness, whilst in other tumours, and even in other parts of the same tumour, they are so attenuated as to be perfectly transparent, or perhaps partially absorbed. In general, however, each individual cell is in itself a shut cavity, having merely a communication with one or more of the same cluster of cells.

The parietes are originally composed of a fibrous or fibro-cellular tissue, though this is itself liable afterwards to undergo various forms of morbid degeneration, and to become the seat of different diseased deposits. These parietes seem often to consist of a minute cystic structure. The lining membrane of the cells is generally of a smooth, glistening appearance, like that of serous membrane; but we have occasionally seen it displaying much more the character of a mucous surface, and it is liable to become coated with coagulable lymph, and to present the other effects of local inflammation. It is amply provided with bloodvessels, ramifying in long and somewhat tortuous branches on the inner surface of the more distended cysts.

We have already said, that projections of greater or less size are very often seen on the internal surface of such cysts, and that these projections consist of a new development of secondary but similar cells.

The tumours formed by the unilocular and multilocular varieties of ovarian dropsy are almost always pediculated. Often, however, in consequence of casual attacks of inflammation during their progress, they become adherent by their peritoneal surface to the neighbouring organs, and particularly to different parts of the pelvis. Their pedicles vary in regard to thickness and length. We have seen an ovarian tumour which filled and distended the whole abdomen, attached by a stalk not much larger than the thumb. In other cases, the basis of attachment, even of small tumours, is much greater and broader; and the pedicle, of whatever size, generally transmits several large bloodvessels.

Symptoms and diagnosis. In the earliest stage of the different varieties of ovarian dropsy which we have described, there are in general few or no symptoms which can render us at all certain of its presence; menstruation, in many cases, is certainly disordered, but, in other instances, remains natural during almost the whole progress of the affection; and, if one organ only is attacked, the patient may even conceive and carry a child to the full time. Generally, towards the commencement of the disease, a sense of weight, dragging, and irritation is felt in the pelvic region, usually referred to one particular side, or to one particular spot of that region. After a time, the corresponding lower extremity becomes liable to œdema, or the patient complains of numbness in it; and dysuria, hæmorrhoids, constipation, or diarrhœa, and other symptoms, indicating compression and irritation of the organs and vessels of the pelvis, supervene. All these symptoms of this early stage of the disease are produced by the pressure of the ovarian tumour, whilst it is still contained within the pelvic cavity; and if an examination be at this time made, a fluctuating swelling of greater or less size may possibly be detected between the vagina and rectum. This tumour is in general still loose and moveable, unless it has already, through inflammatory action, become adherent to the walls of the recto-vaginal cul-de-sac in which it is placed. The ovarian cystic tumour, whilst it is still confined within the cavity of the pelvis, may be mistaken for early pregnancy, or retroverted uterus. From both of these, however, it may be distinguished by its gradual enlargement and very slow growth, and by careful examination through the vagina and rectum, which may enable us to ascertain that the tumour is a swelling distinct from that of the uterus itself.

The first stage of the disease, however, such as we have just described it, very often passes over without attracting, in any degree, the notice of the patient; and the tumour is not detected until it is large enough to have risen out of the pelvis, and to have taken its place in the cavity of the abdomen. Indeed, it often happens that the first symptom by which the patient, or her medical attendant, really becomes aware of the actual presence of ovarian dropsy, con-

sists in the detection, through the abdominal parietes, of the tumour itself. This discovery of the tumour is sometimes made in consequence of symptoms of pelvic or abdominal irritation leading to the examination of these parts, or from the patient suffering from such local or constitutional symptoms as induce her to suppose herself pregnant. In other instances, the detection of the tumour is, at first, altogether a matter of accident; situated towards the mesial line of the body, it often arrives at a very considerable size before its presence is detected. We were lately consulted in a remarkable case of this kind, in which an enormous, but flattened ovarian tumour, reached midway between the umbilicus and sternum, without the patient or her medical attendants being aware of its existence, until attention of the patient was particularly directed to it by the exaggerated reports of a case of abdominal enlargement which, at the time, occupied public notice.

The lateral situation of a cystic tumour of the ovary, and its origin from one of the iliac regions, is generally stated to form an important point in this diagnosis. It is an important sign whenever it can be distinctly traced, but it is, at the same time, not to be always expected, in consequence of the tumour generally stretching early towards the mesial line, or, in other words, growing in that direction from which it meets with least resistance. Consequently, as we have said, when of considerable size, it is often found lying towards the central line of the abdomen; and when, as occasionally happens, the two ovaries are at the same time diseased, we may find them both meeting towards the centre of the abdomen. In such cases, we can generally trace distinctly the line of contact of the two tumours.

When the tumour has risen into the abdomen but is still so small as to float more or less freely in that cavity, it is always liable to produce various symptoms from its occasional changes of position. We know of more than one case, for instance, where in assuming the erect posture, the patient has been liable to incontinence of urine (probably from the pressure of the tumour upon the urinary bladder), and where other nervous symptoms were liable to supervene, similar to those that accompany quickening, and arising apparently from the movements of the tumour in the abdominal cavity. Tympanitis is a very common complication of this stage of the disease. The abdominal tumours formed by ovarian dropsy are generally slow in their growth, and take many months, in some instances years, until they enlarge to any very great extent. Occasionally they apparently become arrested in their enlargement, and remain for a long period of a limited size, whilst in other but more rare instances they fill and distend the whole abdomen in the course of a few months. As the tumour enlarges and distends the abdominal parietes, the cutis of the lower abdomen cracks and fissures as in pregnancy, and large varicose veins are seen spreading their net-work over its surface, an appearance which is met with also in ascites. Cystic ovarian tumours when examined through the abdominal parietes, or through the vagina and rectum, may present either a smooth and equal surface, or may feel unequal and tuberose on its surface. This last is particularly the case when the tumour is of a compound or multilocular character.

When the ovarian collection enlarges considerably, and rises in the abdomen, it displaces, like the pregnant uterus, the intestinal canal upwards and laterally. Hence we have one source of distinction between large ovarian dropsies and simple ascites, in the dull sound, on percussion, over the anterior abdominal region, and the more prominent parts of the tumour in the former disease. In ascites, on the other hand, the intestines generally float in the effusion, and give out a resonance on percussing the abdomen in its more elevated parts; such as the umbilical and epigastric regions, when the patient is placed upon her back. The fluid, in ascites, always gravitates towards the lower part of the abdominal cavity, when the patient is placed, as she ought to be in all dubious cases, in different positions, while the ovarian tumour remains comparatively immobile under the same circumstances. The ovarian enlargement is generally circumscribed, while the ascitic collection is more diffused, and imparts further

a more decided sense of fluctuation. After the tumour has risen into the abdominal cavity, it has often been mistaken for the pregnant uterus, but it may be distinguished from it, by ascertaining through vaginal examination the empty condition and natural size of the uterus itself, by the absence of ballotement, and of the more positive signs of pregnancy, and by there being no proper relation between its degree and mode of development and that of the impregnated uterus. It must, however, be recollected that a sound similar to that of the placental soufflet has been heard in the enlarged vessels of ovarian tumours, and therefore cannot be relied upon as a certain means of distinction.

Cystic ovarian tumours when examined through the abdominal parietes, or through the vagina and rectum, may present either a smooth and equal surface or may feel irregular and tuberose on the surface. This last is particularly the case when the tumour is of a compound or a multilocular character, and sometimes, in that form of the disease, particular inequalities are found firm and indurated, while others are soft and fluctuating.

The degree of fluctuation, traceable in ovarian dropsies, is varied by a number of circumstances. When the walls of the tumour are thick and fully distended, it almost imparts the feeling of a solid body; when the tumour consists of an aggregation of small and unequal sized cells, the fluctuation is often still very indistinct; but it becomes much more so when any of the cells near the anterior surface of the tumour are very large, or when it consists only of one or two large cysts. Indeed, if we except the deduction to be derived from the equal or tuberose condition of the surface of these tumours, we shall find that the only other great distinction between the unilocular and multilocular cyst, consists in their comparative degree of fluctuation, this symptom being much more marked in the former than in the latter. But occasionally, even in unilocular cysts, when the contents are gelatinous and semi-solid, the fluctuation is by no means very marked.

The tumour formed by an ovarian dropsy is not essentially tender on pressure, but it is always liable to become so from the occasional inflammation of its peritoneal covering, or from inflammatory action being set up in its interior. In a few cases, however, neither of these latter contingencies happens during the whole course of the disease, and then the tumour may attain a fatal size without contracting adhesions, through peritoneal inflammation, to any of the neighbouring surfaces.

We have hitherto spoken only of the more local symptoms of ovarian dropsy. In its very earliest stages, the mammæ sometimes become sympathetically irritated, and more or fewer of the constitutional symptoms of pregnancy may be present. Such complications, however, we believe to be very rare; but towards the latter stages of the disease, and when the tumour has become so much enlarged as to fill the whole or the greater part of the pelvic and abdominal cavities, an extensive range of constitutional symptoms is developed by the general irritation which it produces, and by its interference with the functions of various important organs. From the pressure of the enlarged and enlarging tumour upon the different abdominal viscera, their functions become seriously embarrassed, and dyspnœa and palpitation are superadded from the compression even of the thoracic viscera. Dropsical effusions, marasmus, and hectic, supervene, and more or less rapidly undermine the remaining powers of the patient; or inflammation and disorganisation in the tumour itself ensue and hasten the fatal issue.

Prognosis. The different forms of ovarian dropsy, and different cases of the same form, do not by any means always follow the same course, or present the same peculiarities in their progress and termination. The particular variety of ovarian dropsy to which we have adverted, as consisting of a cyst with true hydatids, is so very rare, that we know only of its history from the analogy of similar degeneration in other organs. If we leave it therefore out of view for the present, we shall find that the simple cysts, forming the three first varieties of the disease, as already described, differ most essentially from the fifth

or compound cystic dropsy of the ovary, inasmuch as the former are not necessarily either permanent or malignant. The latter, on the other hand, probably very rarely if ever disappears, and its course in general is slowly though decidedly fatal. After it has once fully formed, however, it certainly appears in some cases to remain in an inactive and stationary state for a very long series of years, and is hurtful principally from its mechanical weight and pressure. In others it passes onwards through its different stages of development and disorganisation, within the course of a few months after it is first observed, and leads to a fatal termination within the year. Between these two extremes, we meet with every intermediate degree in the duration and danger connected with this disease. It is impossible, we believe, to point out any precise marks, which would entitle us to form a very decided opinion of the probable course of any individual case; but if the growth of the tumour be steady though not rapid, and particularly if it suffer repeated attacks of inflammation, the disease in all likelihood will not run a very protracted course.

The more simple forms of ovarian dropsy which consist of single cysts, are certainly sometimes removed by the effects of nature, or by the interference of art. The fluid contents of the cyst would appear to become in some rare instances gradually absorbed, or adhesive inflammation occurs in and obliterates the cyst, or the cyst becomes ruptured and perforated. In this latter case, it may discharge its contents into the abdominal cavity, or if it has previously formed adhesions with some hollow viscera, it may evacuate itself into the cavities of these viscera, or through fistulous openings at the umbilicus or groins. These terminations, however, even in cases of single or unilocular cysts, are rare, and form remarkable exceptions to the rule rather than the rule itself.

The recorded histories of some cases of ovarian disease, which from their symptoms were supposed to be of a multilocular character, have, we must confess, greatly surprised us, in regard to the allegation of their ultimate and complete removal and cure. We can suppose the possibility of such an occurrence in cases of simple ovarian cysts, but whoever has examined attentively the structure of a multilocular ovarian tumour, even of very moderate magnitude, will be ready to confess the utter hopelessness of its removal, either by nature or art. In the cases of supposed cures of such disease, there must, we are inclined to think, be something radically wrong in the diagnosis, and we might quote various high authorities to show how easily such a mistake might occur, and the best practitioners be deceived, in consequence of swellings occasionally forming in the iliac and adjoining regions, and resembling ovarian and other abdominal tumours in many points, but consisting apparently only of some morbid states of the abdominal parietes, or of partial inflations and distensions of the intestinal canal with fluid and fæculent matter. These swellings have been seen to resemble ovarian tumours even in regard to their duration, as well as most of their physical characters, and are only with certainty to be distinguished from them by their occasional changes in volume, by the presence of marked hysterical symptoms, and by the ultimate favourable progress of the case. The *post mortem* inspections of such cases of supposed cure of ovarian cystic dropsy would be extremely valuable, from the negative if not from the positive information which they might convey. In two of the instances in which the operation of extirpation of an ovarian dropsy has been attempted in Britain, no tumour whatever has in reality been found in the abdomen, after this cavity has been laid open by the knife. The true pathology of such deceptive cases of abdominal swelling is certainly at present a great desideratum in practical medicine.

Causes. It is perfectly unnecessary to dwell upon the different causes which have been alleged to give rise to ovarian dropsy, because we have no information on this subject which can be as yet considered as sufficiently precise and well established, except the circumstance that the variety of the disease which consists in dilatation of the Fallopian tube seems to be legitimately traceable to previous inflammatory obliteration of the extremities of that canal.

Ovarian dropsy is seen to occur both in the married and unmarried; indeed, no age is entirely exempt from it. It is frequently not remarked till a very advanced period of life; most generally it occurs during the active period, or towards the decline, of the reproductive functions; in a few cases it has been observed in the child before puberty, and we have even seen the commencement of it in the fœtus in the existence of serous cysts attached to the broad ligaments.

It has occurred occasionally so often in members of the same family, that it has been considered to be hereditary.

Treatment. The treatment of ovarian dropsy may be divided into, 1. the employment of measures of a medical nature; and, 2. the adoption of different surgical operations for its partial reduction or complete removal.

Medical treatment. Various classes of medicines and numerous individual remedies have been at different times employed and lauded in the treatment of ovarian dropsy: diuretics, diaphoretics, sialagogues, purgatives, and even emetics have been each in turn supposed capable of removing the effusion. In particular, several different species of diuretics have been had recourse to with this indication, and with alleged good effect. At the present time, little faith is placed in the action of any internal remedies in the treatment of this disease, and it certainly seems as hopeless a task to endeavour to remove the organised cyst or cysts, and fluid contents of an ovarian dropsy by internal medicines, as it would be to produce the absorption of the structure and contents of a local or external encysted tumour, by the same constitutional means.

The remedies which are at the present day principally employed by British practitioners for the purpose of resolving ovarian collections are the muriate of lime, different preparations of mercury and iodine taken internally or applied locally to the hypogastric regions. It is more than doubtful, however, if they possess any immediate efficacy in removing or even in arresting the disease. In constitutions in any way debilitated, the two latter remedies often more than counterbalance any good effects that they might otherwise be expected to exert upon the local disease, by their injurious agency upon the general health of the patient. And, assuredly, one great indication which we ought to follow in the treatment of this and of other analogous diseased states that are little amenable to medical treatment, is to keep the patient's system as near the standard of health as possible; for, by this means, we in general possess indirectly much more power over the progress of the existing morbid action than we have directly through the medium of any class of remedies.

At the same time, however, that we thus express our doubts of the efficacy of any known therapeutic measures in procuring the resolution of ovarian dropsies in either their first or subsequent stages, we by no means intend to deny that all medical treatment is useless in the progress of the disease. On the other hand we often observe the greatest benefit from measures directed to the treatment of the various complications that are so apt to arise during the progress of the malady. In particular, the use of general or local bloodletting, and other antiphlogistic means, is often called for in consequence of inflammation arising in the substance or walls of the tumour. In some cases these attacks may never occur, or occur very rarely, but in others they are extremely frequent, and excited by very trivial causes. In every instance it is an indication of paramount importance to subdue these inflammatory actions as speedily as possible, for they seem, as a general rule, to have a great and deleterious influence over the progress of the disease, by hastening the morbid actions within the tumour, increasing its effusions, sometimes disorganising its interior, and often leading to morbid adhesions between its peritoneal surface and those of the adjoining viscera, that may immediately or subsequently lead to distressing consequences.

Some practitioners would seem indeed to rely upon small bloodlettings and local counter-irritants and issues, as almost a means of absolute cure in ovarian

dropsies; and, though we certainly do not believe that they can remove the disease, we are strongly of opinion that, in some cases where the tumour has a tendency to rapid increase, these means will be found more or less effectual in checking its progress, by restraining the local, congestive, and inflammatory actions which seem so much under these circumstances to hasten its development and disorganisation.

Local friction, percussion, electricity, and galvanism, have each had their supporters in the treatment of ovarian dropsy, but none of these measures seem worthy of confidence.

In some cases, where the tumour was loose and movable in the peritoneal cavity, we have found an abdominal bandage afford the patient considerable relief.

Irregularities in the functions of the bowels, bladder, and uterus often distress the patient much in ovarian dropsy, and sometimes require for their correction the best directed efforts of the practitioner. Occasionally the mechanical impediment to the discharge of the rectum or bladder, caused by the presence of the whole ovarian tumour or of a part of it in the cavity of the pelvis, has defied all medical treatment, and been at once relieved by pushing upwards the impacted portion of tumour above the brim of the pelvis.

Surgical treatment. After an ovarian dropsy has passed through its first stages, and has become fairly formed, no measure seems calculated to afford any permanent prospect of relief, except a surgical operation; and it must at the same time be confessed, that surgical interference in this disease has hitherto been followed by very unsatisfactory results.

Various surgical operations have been proposed for ovarian dropsy, some only as palliatives, and others with the view to the radical cure or complete removal of the disease. We shall briefly allude to the principal operations that have been suggested, and content ourselves by referring, for a description of the different steps of each, to works on surgery.

1. *Paracentesis, or tapping.* This is the operation which is most frequently practised in ovarian dropsy by British surgeons. It may be employed either as a temporary palliative in order to reduce in a greater or less degree the volume of the swelling, or it may be had recourse to under the hope of producing the permanent and complete removal of the effused fluid. From what we have already stated, with regard to the different forms of ovarian dropsy and the intimate structure of the enclosing cyst, it will be evident, that tapping can only be performed with this latter indication in the unilocular variety, and in cases where the fluid effusion is limpid and serous. Even in these cases, however, the operation very rarely succeeds in effecting a permanent cure. In the multilocular variety of ovarian dropsy, where the fluid is retained in separated isolated cysts, tapping can only be of use as a palliative, and that too only when one or two of the constituent cysts are enlarged to a much greater extent than the others, and may give relief by the evacuation of their contents. When the component cysts are small, and all nearly of equal size, and their contained fluid is, as very often happens, of a gelatinous consistence, the operation is perfectly useless, as only the one or two cells which are opened by the trocar will be evacuated, and that, with great difficulty, in consequence of the consistence of their contents.

It has been proposed to perform the operation of tapping at a very early stage of ovarian dropsy, and when the tumour is still small and confined to the cavity of the pelvis, or is lying in one of the iliac fossæ. We are not aware of any instance in which the operation under these circnmstances has been successfully resorted to. Indeed, it seems to be a rule very generally followed, though not very generally acknowledged, in regard to tapping in ovarian dropsy, that it is not to be employed except when the health of the patient is in more danger from the mere mechanical size of the tumour than what is likely to result from the operation itself. Consequently, it is usually resorted to only after the disease has fully formed, and has acquired such a size as to

demand surgical relief, though only as a palliative, and at the risk of the dangers of the operation.

Before resorting to tapping, in this affection, it may be well to weigh, in each case, the disadvantages and dangers of the operation against the benefits that are to be expected from it. We must recollect that, 1. The fluid is always extremely apt to accumulate, very few instances of the reverse, or, in other words, of the permanent removal of the fluid by this operation having been hitherto put upon record. When once commenced, therefore, the operation requires to be repeated from time to time. 2. Difficulties may exist in regard to the operation; and the benefits, expected to be derived from it, may be counteracted by the cysts being small and multilocular, or the effused fluid so viscid as to render its escape, through any ordinary opening, a mechanical impossibility. 3. In cases in which the operation is performed with ease, the patient may nevertheless sink, in consequence of direct exhaustion after the cyst is evacuated; or inflammation of the peritoneum, or of the walls of the cyst may supervene, and lead to a dangerous, if not a fatal, result.

2. *Obliteration of the cyst by adhesive inflammation.* Some surgeons have attempted to produce in the walls of the ovarian cyst, after its fluid has been evacuated by tapping, a degree of inflammation sufficient to produce adhesions between the opposed surfaces of its lining membrane. In fact, in this way, the radical cure of hydrocele has been attempted upon ovarian dropsy, but certainly by no means with success sufficient to encourage its repetition. The cyst, for the purpose in question, has been injected with stimulating fluids in some instances, and irritated by the presence of a seton in others. Where the walls of the inflamed cyst are the seat of projecting secondary cysts (as we have shown them to be in many cases), we should scarcely expect the inflammation to produce sufficient adhesions, provided we dared to venture upon the experiment of exciting it.

If we desired in ovarian dropsy to act upon the same principles as those which guide surgeons in the treatment of hydrocele of the tunica vaginalis, it would probably be safer to imitate them in their late attempts to produce absorption of the fluid and adhesive inflammation in the walls of the cyst, by the use of acupuncture needles, aided by the action of galvanism or electricity. We might, certainly, decompose the fluid by galvanic needles, and then that fluid itself might, possibly, act as an irritating and foreign body upon the lining membrane of the cyst; but would the inflammation thus lighted up be followed in any case by sanatory results, in regard either to producing the ultimate absorption of the effusion, changing the action of the cyst, so as to repress its further secretion, or leading to its obliteration? Such results could scarcely be expected where the cyst or cysts are large, and it would be of little or no use in the multilocular form of the affection. Are there any cases of the disease in its early stage, in which it would be likely to be of more benefit?

3. *Incisions into the diseased ovary.* It has been proposed to make an extensive incision into the swelling through the abdominal parietes, so as to form an external fistula communicating with the cavity of the tumour; and again, it has been suggested to make such an incision into the parietes of the ovarian collection, as would allow it to evacuate its contents into the cavity of the peritoneum, where, it is conceived, they might be removed by the peritoneal absorbents. The former operation has been practised, and in one or two cases with a favourable result, but we are not aware that the latter has ever been attempted, and we should fear greatly, that it would lead to the excitement of inflammation of the peritoneum rather than to a simply increased action of the absorbent vessels of that membrane.

These two operations of large incisions into ovarian tumours, though less frightful, can scarcely be considered as less dangerous than their complete excision.

4. *Extirpation of the ovary.* This formidable operation has been practised in two different methods. namely 1. by freely opening up the abdomen, and ex-

tirpating the ovarian tumour in its entire state; and, 2. by making a smaller incision through the abdominal parietes, evacuating the tumour by tapping, and immediately afterwards pulling it out, in its empty and collapsed state, and cutting it off as nearly as possible to its root.

The latter of these operations, though the safer and less difficult in its execution, could never, of course, be made available in cases where the tumour was composed of an aggregate of small cysts, and further, the adoption of either must always be liable to very great difficulties and danger in its execution, from 1. the chance of the existence of such morbid adhesions of the tumour to a neighbouring viscus, or to the abdominal or pelvic peritoneum, as would prevent its displacement and extraction; 2. the size of the bloodvessels supplying the tumour, and the difficulty of properly securing them; 3. the probability of the disease being conjoined with carcinomatous degeneration of the organ, and the inutility of its removal under such circumstances; 4. the dangers more immediately accompanying the operation, such as exhaustion, hæmorrhage, and particularly peritoneal inflammation.

When we consider these several circumstances in relation to excision of the ovary, and take also into account the mistakes that are liable to be made in the very diagnosis of the tumour, and the difficulties surrounding the actual performance of the operation itself, in the abstract, we should undoubtedly be inclined to condemn it unconditionally as a surgical resource which ought to to be avoided and rejected. But at the same time we freely confess, that in looking over the recorded histories of this operation, and thus appealing, as far as possible, to facts alone, we have felt surprised at the comparative success which has accompanied its performance. Thus, out of about thirty operations, to the histories of which we have reference, not above one in four died, which is nearly the average mortality in lithotomy. In several, the operation could not be completed in consequence of adhesions, and in others, the result was not satisfactory, though the patient survived. In about half the cases, or in fourteen or fifteen instances in all, the operation has now been more or less completely successful. Dr. M'Dowell has recorded not less than five successful cases. (*Good's Study of Medicine*, edited by Dr. Doane of New York, vol. ii. p. 590.)

We do not state these results for the purpose of encouraging the greater frequency of extirpation of the diseased ovary. On the other hand, we believe that there are very few, if any cases, in which it can be justifiable. It is no doubt the only means by which we can hope completely to remove the multilocular ovarian cyst; and that form of cyst, we believe, has no marked tendency like carcinoma to malignant reproduction, though, when abandoned to itself, its structures undergo morbid changes and actions which almost always inevitably prove fatal after a greater or less relapse of time. Excision is also the only certain means of fully eradicating an unilocular cyst. The operation of tapping may certainly palliate both forms, but, as we have already said, it very seldom indeed proves the means of permanent cure. In an immense proportion of cases it requires to be repeated again and again; and thus, while it acts as a palliative for the time being, in as far as regards the constitution and symptoms of the patient, it often tends to hurry on the disorganising processes, which are apt sooner or later to occur in the structures composing the tumour, and this is also in itself an operation certainly though slowly dangerous.

In the uncomplicated forms of ovarian dropsy, when no adhesions with the neighbouring organs exist, and when the tumour is decidedly pediculated, the operation of excision may certainly be performed with less danger to life than was some years ago supposed; but we still want sufficient means to enable us to make a sure and correct diagnosis of such cases. In some of the instances to which we have above alluded, the abandonment of the operation, even after the abdomen was laid open, shows that it has been repeatedly attempted in cases for which it was not at all suited. But again most of those cases which are most favourable for the operation, are exactly those which give the patient

comparatively little distress, and that may reasonably be expected to go on for a considerable time, possibly for years, without materially affecting the health or life of the patient. If in such a case an adhering and pediculated tumour give rise to any such symptoms as totally destroyed the comfort of the patient, or threatened any immediate danger, then possibly the alternative of an operation might become a question of serious consideration. These cases, however, we repeat, are exceedingly rare, and we cannot, we think, better close these observations on the treatment of ovarian dropsy, than by quoting, as applicable to that disease at the present time, the remarks which Dr. William Hunter published upon his experience in it, upwards of half a century ago. "I have had occasion (he observes) to see a great number of encysted dropsies of the ovary, many of them treated by physicians of the first rank, and yet have never seen one cured; nor have I ever known one case of that kind, where the cyst has been sensibly diminished in bulk by any other means than the trocar. If I may form a judgment from what I have seen both in the living and dead body, I should believe that the dropsy of the ovaries is an incurable disease, and that a patient will have the best chance of living longest under it, who does the least to get rid of it."

STRUCTURAL DISEASES OF THE OVARY.

Hypertrophy and atrophy.— Morbid transformations and simple tumours.— Cystic tumours containing hairs, &c. — Malignant degenerations. — Symptoms of the preceding ovarian diseases, and their treatment.

Hypertrophy and atrophy. The ovary is occasionally found hypertrophied. The diseased change may implicate all the tissues of the organ, or may affect its proper tissue, or its fibrinous coat alone. This fibrinous coat is indeed very often thickened, either throughout its whole extent, or in parts only in the aged female. Under such circumstances the tissue of the ovary is not unfrequently found in a state either of induration or cellular atrophy. In many instances the partial thickening of the fibrinous coat appears to take place around the seat of old cicatrices.

It often happens that we meet on the dead body with hypertrophy of one or more of the Graafian vesicles, its cavity being enlarged, its coats thickened, and as we have stated above, not unfrequently there are the remains of effusions of blood, or of coagulable lymph, upon its internal surface. We have repeatedly seen this effused blood of a colour almost as black as a melanotic deposit.

Morbid transformations and simple tumours. The ovaries are not unfrequently the seat of various forms of morbid transformation and diseased growths, generally leading to induration of the organ. Its fibrous coat is liable to cartilaginous and ossific degeneration, and the proper internal structure of the organ passes more rarely into the same varieties of morbid transformation. Generally, however, before doing so, the ovarian structure itself undergoes a change into the intermediate forms of morbid fibrous tissue.

Occasionally, true fibrous tumours, resembling in their pathological nature those of the uterus, form in the ovary or in the broad ligaments. These tumours occasionally acquire an immense size. We have a specimen of this morbid structure, taken from a tumour in the ovarian region, that weighed fifty-six pounds. It had been first observed about twenty years previously to death, in the right iliac region. It was then of the size of an egg, and had gradually increased from that period till at last it rose as high as the diaphragm, and compressed

even the cavity of the chest. The circumference of the abdomen after death was five feet four inches. The tumour was quite moveable within the abdomen, and was only attached at two points, namely, by a few old, cellular adhesions to the larger omentum, and by its original pedicle to the right broad ligament in the site of the ovary. This last organ was apparently incorporated with the morbid mass, or at least was not visible. The artery and vein of the ovary passed into the tumour, and were of enormous size. The uterus was healthy. In one portion the tumour was softened and disorganised, probably from compression of the vessels of that part and consequent gangrene. We know the histories of two tumours of the same character and of nearly the same size which were found on dissection to be attached by their pedicles to the broad ligaments, and to be totally independent of the ovary.

Cystic tumours containing hairs, &c. The ovary, as has been previously pointed out, is a common seat of tumours of a cystic character. It is also by far the most common locality in which we meet with those remarkable species of cystic growths, that consist of morbid formations of cutaneous, pilous, dental, and bony tissues. Such tumours occasionally reach a large size, and contain a considerable quantity of hair with a number of teeth, and sometimes tissue of the structure of the nails. The teeth are generally found in a cartilaginous or osseous band crossing one side of the cyst or walls of the tumour, the cavity of which is always filled with a quantity of fat, or steatoid matter, which we believe to be quite peculiar to this form of growth. We have known a tumour of this kind impede delivery, and its fatty contents, when evacuated by the trocar, made the nature of the obstructing mass at once certain. In a practical treatise such as the present, it is unnecessary to enter into the conflicting opinions with regard to the pathological nature of such tumours, although the consideration of it forms at the present time one of the most interesting subjects, in morbid and teratological anatomy.

Malignant degenerations. Solid structures of a malignant nature may become developed in the ovary. We have seen instances both of carcinoma and of true encephaloid disease in this organ, but still they are rare. These affections are seldom primary, and are generally found after the same diseased state has betrayed itself in other viscera. The same remark applies to true melanosis, which is rarely found in this organ, unless as a secondary seat of the deposit.

Many pathologists include the compound cystic tumour of the ovary (which we shall describe in the sequel as the most frequent form of ovarian dropsy) among the malignant growths pertaining to this organ. It agrees with carcinoma in some points of its history, but differs from it in others. Thus, the peculiar form of structure, constituting the multilocular cystic tumour (the *areolar* or *gum cancer* of some authors), whether occurring in the ovary or elsewhere, has no tendency to repeat itself in a secondary form in different and distant organs of the body; or, in other words, it is not at first, nor does it during its progress, become a constitutional disease; although, on the other hand, it generally shows a more marked disposition than even carcinoma itself to spread from tissue to tissue, and from organ to organ, through mere continuity of structure. We have seen it, in this way, transforming into one common cystiform mass the contiguous portions of the stomach,—omentum, transverse colon, and under surface of the liver. The isolated character of the ovary prevents it showing this peculiar tendency in that situation; but we have known it to affect, and produce its peculiar form of degeneration in the tissue of the omentum, when it happened to be bound to the diseased ovary by strong adhesions. The compound cystic tumour may co-exist with true carcinoma in the ovary, or may form (like any other tissue, either healthy or morbid) the seat of malignant deposits; but that, we conceive, is only an incidental circumstance, and cannot be regarded as a part of the natural history of the disease. It has little or no tendency to recurrence, or reproduction, in the locality from which it is once fully removed. Further, the compound cystic tumour often becomes, in its latter stages, partially broken up in its

interior, and some of its cells may show marks of ulceration; but these changes may be traced to the effects of inflammatory and gangrenous disorganisation, and are not results of the internal destructive degeneration peculiar to growths of a truly malignant character. Carcinomatous and melanotic tumours of the ovary seldom reach to a great size, but occasionally the encephaloid disease here forms a swelling as large as the head of the adult, and passes more or less rapidly through all the stages peculiar to that affection, as it is seen in other organs. On the other hand, the compound cystic tumour, as we shall afterwards see, often increases to such an enormous size as to fill and distend the cavity of the abdomen, and even to press up the diaphragm.

Symptoms. The ovary is isolated both in its anatomical situation and physiological functions, and its diseases excite so little sympathetic action in any other viscera that, in general, we have no marks of the existence of any of the preceding morbid changes of structure in the organ, as long as its mere volume is not much increased. If the disease, however, should produce considerable enlargement of the organ, we may then have different symptoms induced: 1. in consequence of derangements in the functions of the uterus, rectum, and neighbouring viscera, from the mechanical pressure and irritation of the tumour; and, 2. we may have, as a guide, the physical characters of the tumour itself. The details which we have given in relation to these two sets of symptoms under ovarian dropsy, apply equally to the preceding set of morbid degenerations.

When both ovaries are affected, the function of menstruation will be arrested, and sterility follow as a consequence. Further, in these ovarian growths, we have occasionally a set of symptoms superadded in consequence of inflammation arising in the tumour, and in the last stages of malignant disease, the constitution may present all those symptoms which usually accompany the advanced progress of such affections.

Treatment. In cases of ovarian disease, such as those which we have thus briefly described, medical treatment, when required, is generally limited to the reduction of inflammatory action when it does supervene, and to the alleviation of the complaints induced by the mechanical pressure and irritation of the tumour. The means of fulfilling these two indications have been stated in detail in the chapters on INFLAMMATION OF THE OVARY and OVARIAN DROPSY.

The remarks that we have made under the head of OVARIAN DROPSY, in regard to the extirpation of ovarian tumours, will, with slight limitations, apply to the removal of very large pediculated tumours of a simple fibrous character in the same situation.

In the ovary, as in other internal organs affected with carcinoma, encephaloid disease, or melanosis, medicine is of no use except as a palliative, and the resources of surgery are equally unavailable.

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